GAS

FORMERLY WESTERN GAS

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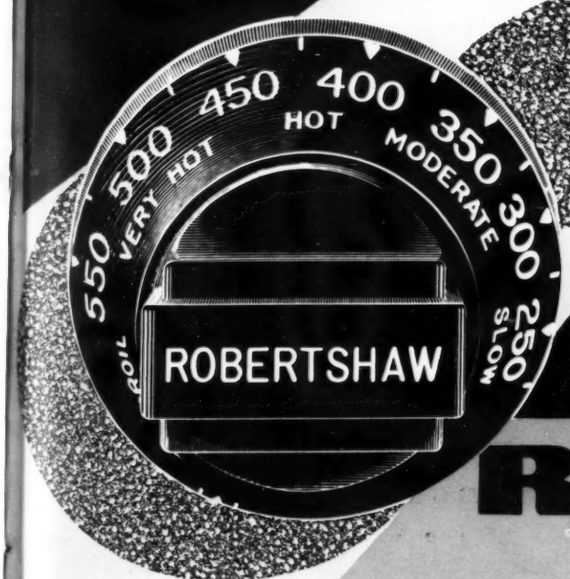
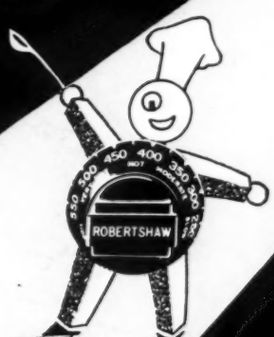
SPOTLIGHT YOUR GAS RANGES AS MODERN!





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Shine in the floodlight of modern gas range publicity turned on by the American Gas Association. . . . Prove to customers that the ranges you sell are modern by showing that they are Robertshaw-equipped. . . . Point out that this dial brings perfect control of oven temperature — brings new savings by reducing shrinkage of food and waste of fuel, while retaining food flavors. . . . It will pay you to play up the Robertshaw dial. It is the mark of the modern gas range. It packs the selling punch of a product advertised to women for over 16 years.

ROBERTSHAW THERMOSTAT COMPANY, YOUNGWOOD, PENNA.

OVER 2,600,000 IN USE

ROBERTSHAW

OVEN-HEAT-CONTROL

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He is an ordinary laborer assembling a stuffing box type mechanical joint. He does it easily, quickly, using a single tool. This is one of several designs of mechanical joints, identical in principle, made by C. I. P. R. A. members, and proved gas-tight by tests conducted in the A. G. A. laboratory.

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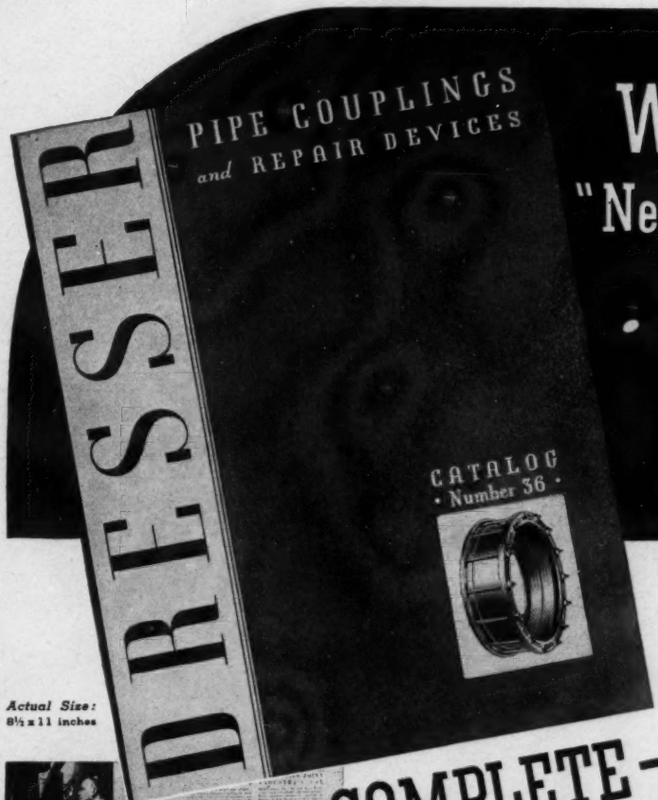
CAST IRON PIPE

THE STANDARD MATERIAL FOR DISTRIBUTION MAINS

The Cast Iron Pipe Research Ass'n, Thos. F. Wolfe, Research Engineer, 1013 Peoples Gas Bldg., Chicago



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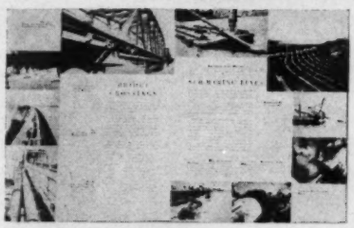
. . . but it's really a pipe-line handbook!

NEW—COMPLETE—AUTHORITATIVE
WRITTEN BY MEN WHO KNOW!



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GAS

FORMERLY WESTERN GAS

LOS ANGELES Office: 810 South Spring Street. Phone Michigan 1481
CHICAGO Office: 1064 Peoples Gas Building. Phone Harrison 8536

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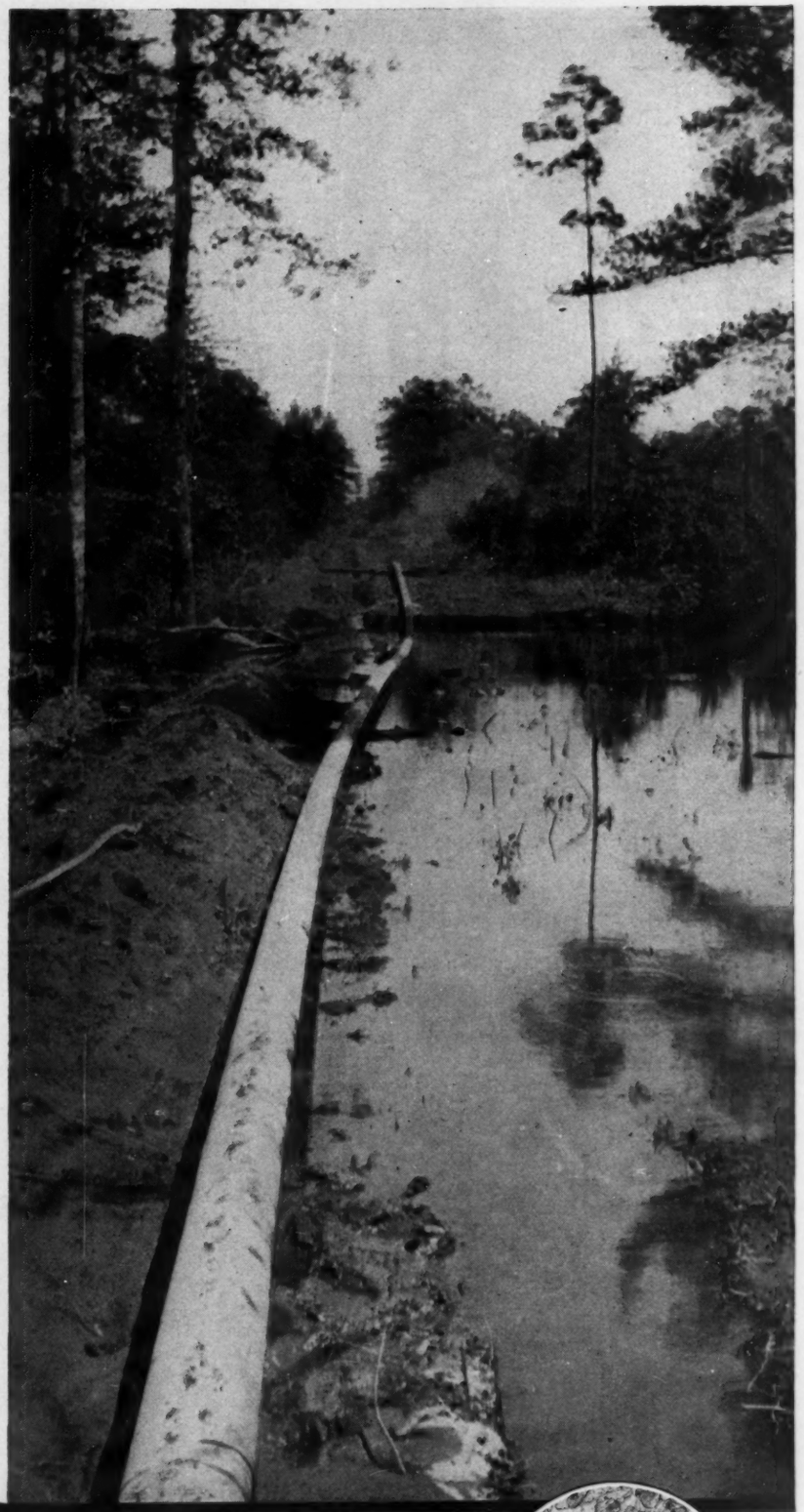

Barrett

PIPE LINE ENAMELS

Maximum Protection at lowest cost per year of service . . .

To provide effective protection, a pipe line coating must be tough and adhesive, water-resistant, dielectric and impervious to oxidation or deterioration through constant contact with earth acids or by submersion.

Because Barrett Pipe Line Enamels are outstanding on all these vital points, they afford a sound solution to the pipe line engineers' corrosion problems. They provide maximum protection at the lowest cost per year of service

THE BARRETT COMPANY

40 Rector Street, New York, N.Y.

FIELD SERVICE . . .

Carefully trained Barrett field men will gladly work with you, combining their special knowledge and experience with your familiarity with conditions along the right of way.

Courtesy United Gas Public Service Company

Reproduction of the micrograph at right shows the interlocking of the flakes of the internal reinforcement used by Barrett. By laminating with the waterproofing agent they give Barrett Pipe Line Enamels unusual toughness and resistance to soil stresses. For pipe of large diameter, The Barrett Company will furnish equipment required to revolve pipe and spread enamel.

PARKHILL-WADE, Inc.

CONSULTING and CONSTRUCTION ENGINEERS

973 North Main Street, Los Angeles, California

Affiliated with The Stearns-Roger Manufacturing Company in the design and construction of....

GAS DEHYDRATION UNITS with
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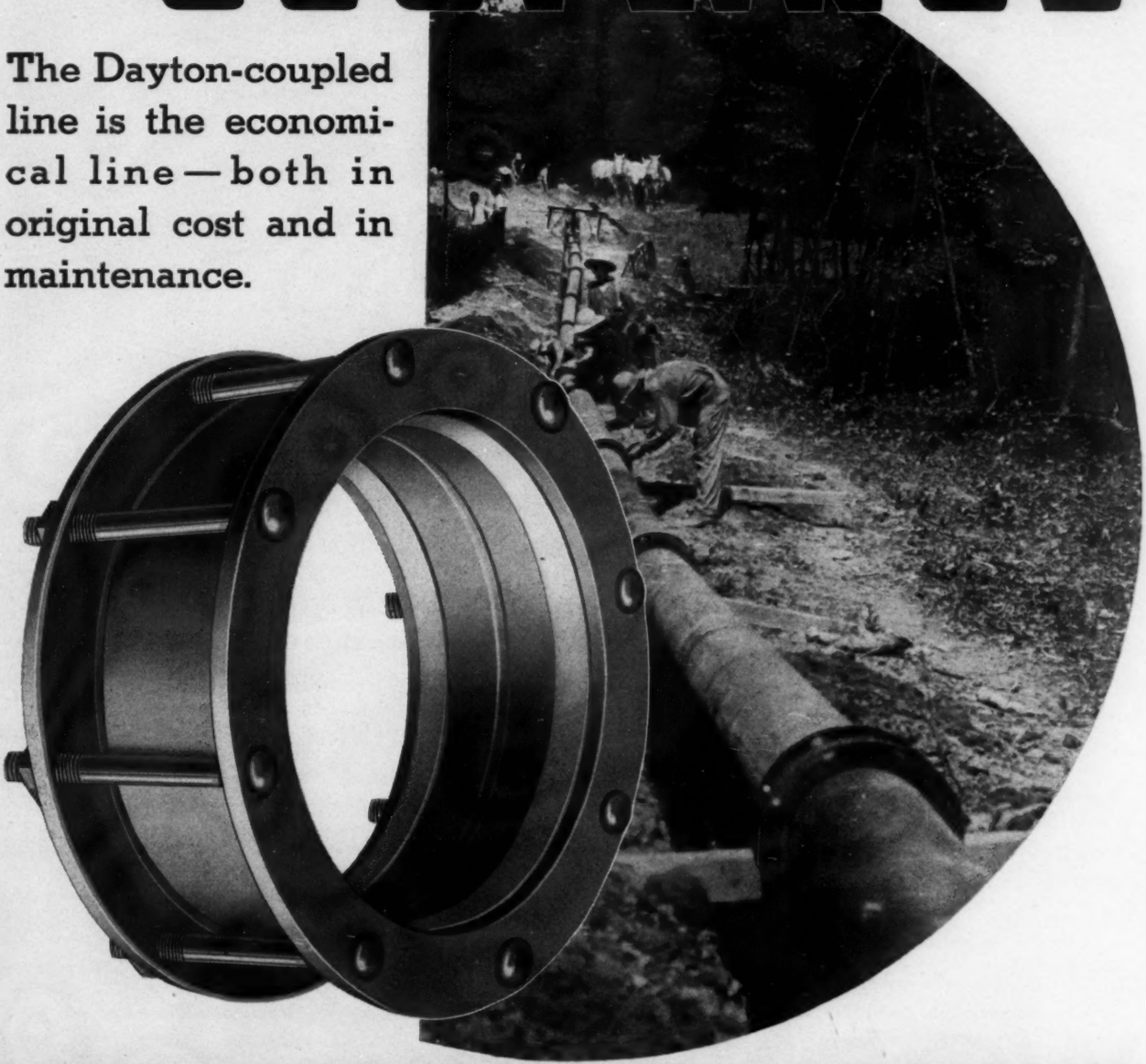
BUTANE STORAGE and HANDLING EQUIPMENT

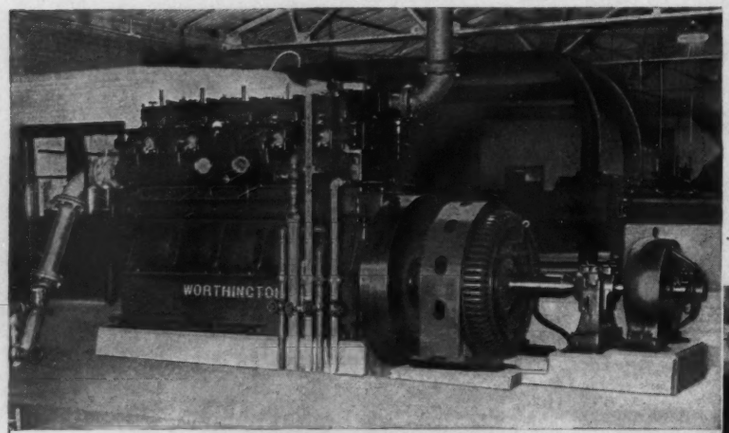
DAYTON NO. 1 COUPLINGS

The Dayton-coupled line is the economical line—both in original cost and in maintenance.



THE NATIONAL-SUPERIOR COMPANY
DAYTON PIPE COUPLING DIVISION DAYTON, OHIO

YOU CAN INCREASE YOUR GAS SALES *and* REDUCE CONSUMERS' POWER COSTS *with* WORTHINGTON GAS ENGINES



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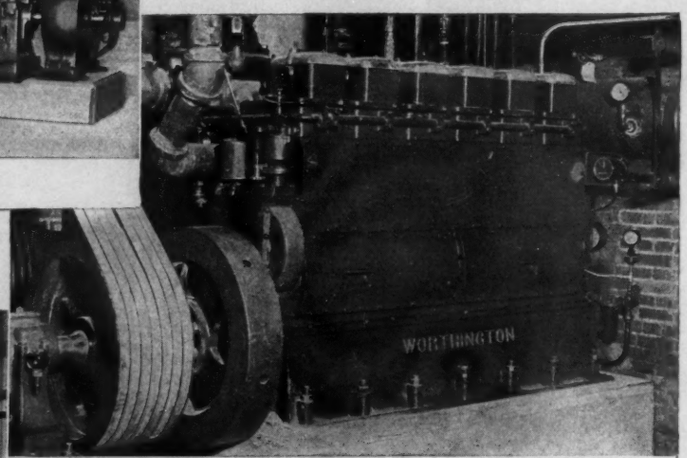
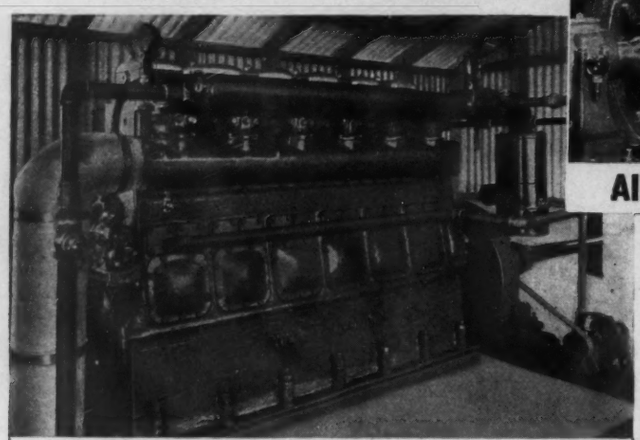


AIR CONDITIONING AND REFRIGERATION



WATER SUPPLY AND IRRIGATION

Worthington engineers will assist you in any gas power problem . . . with 35 years of engine building and application experience to support their recommendations.

The normal use of gas power will improve your load factor.

With Worthington gas engine power there are no standby charges. Starts are instantaneous.

Worthington Gas Engines operate at medium speeds, are built for continuous loads, and are available in sizes from 15 to 1800 horsepower.

• *Complete descriptive literature available*

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General Offices: **HARRISON, NEW JERSEY** - *Branch Offices and Representatives in Principal Cities throughout the World*

WORTHINGTON

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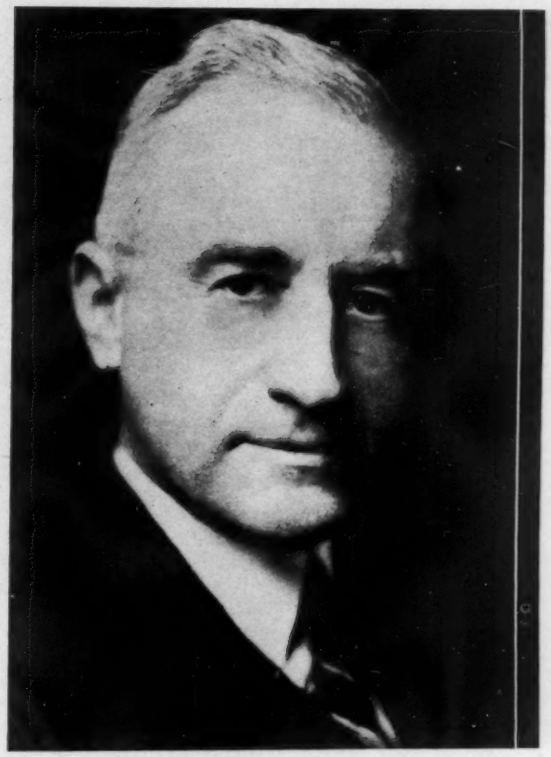
GAS
November, 1936

Guest Editorial



1936 Record Fortifies Industry's Outlook

By ALEXANDER FORWARD

Managing Director, American Gas Association

THE recent Atlantic City Convention of the Association demonstrated in no uncertain terms the new spirit of confidence within our own ranks in the future of the gas industry. All along the line, there is evidenced a quickened interest in the destiny of our business and a determination on the part of management and personnel to bring about a larger public appreciation of gas service. The morale of the industry was never better. All we need in order to reach our goal is continued faith in the superiority of our product and our appliances.

One may well ask the question, "Is this confidence in the future well placed?" The facts show that it is.

Domestic customers served by manufactured and natural gas utilities totalled 15,236,600 on August 31, an increase of nearly 100,000 during the first eight months of 1936. This gain in customers is reflected in the fact that a total of some 910,000 gas ranges were sold in the country during the first eight months of this year. This was an increase of 28 per cent over the first eight months of 1935. Approximately 80 per cent of such sales consisted of relatively high priced ranges incorporating modern automatic features, such as oven-heat control, etc.

The past year and a half has been characterized by an increasing appreciation of the great potential market for domestic water heating. There has been a widespread adoption of rates more favorable to the use of gas for this purpose. This has been accompanied by a marked acceleration of local sales effort and a nation-wide coordinated campaign to promote the use of gas for water heating. So successful have been the results of this program that it will be continued during 1937. For instance, the sale of automatic type gas water heaters during the first eight months of 1936 was running more than 50 per cent above that of a similar period during 1935.

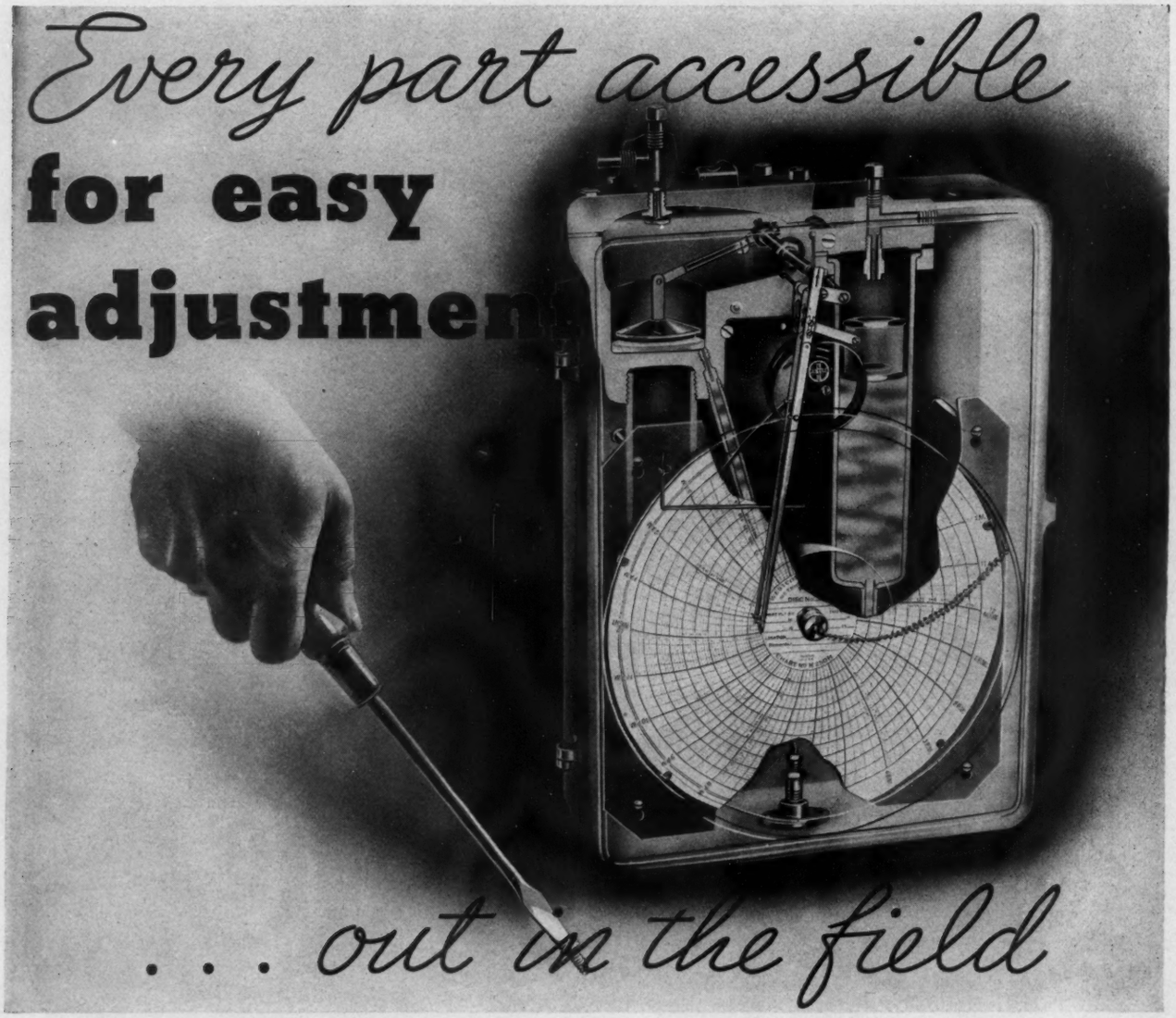
Many gas companies have also recently inaugurated more favorable rates for gas house heating through central plant burners and equipment. The sale of such equipment registered an increase of more than 100 per cent during the first eight months of 1936.

As this is written sixteen regional meetings are being scheduled from coast to coast in connection with our national advertising program. This big cooperative drive, supported by more than 700 gas companies, offers tremendous possibilities for good to our business. All those in charge of this activity are in high hopes that its inauguration will mean a new day for us. There is no question in my mind but what these hopes can be attained, provided the hundreds of gas companies which make the effort financially possible put their shoulders to the wheel and give the national push the local identification it must have to be fully successful.

We enter the new association year ready to meet new responsibilities and new opportunities.

We are a united industry. All of us, executive and employee alike, are eager to build a larger load and capture new markets. The measure of the success we meet in this respect will be limited only by the amount of determination we apply to the tasks at hand.

Every part accessible **for easy adjustment** *. . . out in the field*



IT TAKES A PRACTICAL INSTRUMENT to earn the reputation for low-cost accuracy which Westcott orifice meters enjoy throughout the world.

That simplicity of design and experienced engineering are primarily responsible, is obvious to any engineer familiar with flowmeter operation.

But Westcott orifice meters and flowmeters go still further in giving you a **PRACTICAL** instrument; all parts are made for easy adjustment with ordinary tools. A minor feature of Westcott meters, to be sure . . . but one more important detail in reducing the cost of accuracy out in the field.

New literature is complete with data on the design and application of these instruments. Specifications are now available also on the popular new Round Case Indicating Flowmeter.

AMERICAN METER CO. MEASUREMENT ENGINEERS CENTENNIAL 1836-1936

AMERICAN METER COMPANY
INCORPORATED
Measurement and control of Gas, Oil, Steam, Air and Liquids
PACIFIC METER WORKS • LOS ANGELES • SAN FRANCISCO

345

November, 1936

GAS

Vol. XII, No. 11

TWELFTH YEAR OF PUBLICATION

LOS ANGELES—810 South Spring Street . . 1064 Peoples Gas Building—CHICAGO

KEYING ADVERTISING TO THE NEEDS OF A COMPETITIVE SITUATION

By GEORGE H. FINLEY

Editor, GAS

MOST merchandisers agree that the best selling is that which does a straightforward job of promotion around the merits of the particular product being exploited—leaving competitive products out of the picture. However, situations arise when these tactics have to be modified, as gas men in competitive fuel areas well know. The Seattle area is a case in point.

In Seattle the municipal electric utility's advertising left the gas company no choice but to meet direct comparisons with point-by-point copy which capitalized the advantages of gas and modern gas appliances at the expense of comparable electric equipment. Electric advertising went so far as to feature "fumes," and alleged hazards of gas service in the home. So the question was, what type of gas messages would help to offset the electric campaign without sinking to its level of misstatement and half truths.

Seeking the answer to this question the company's advertising counsel at the instruction of President Jas. T. Pollard went into the homes of 1100 Seattle women, asking them what type of range they would buy if they were in the market for a range, and why they would buy the type specified.

On the strength of this survey it first appeared logical to build the gas appeal around speed of performance. It was decided, however, that this argument was not sufficiently forceful with those users of electric ranges in Seattle who were fully satisfied with them from the standpoint of performance. With the city's gas and electric range customers nearly the same in number this factor was important, as much of the future growth in gas range customers must come by displacement of electric ranges.

Examining further into the survey for "plus values" which would have general appeal, it was decided to build a campaign around the slogan "Foods Taste Better Cooked with Gas." This theme hit a common denominator of home interest and would get attention from both gas and electric range users.

So there followed a five- to six-week advertising series, with insertions staggered in three metropolitan papers, developing the fact that foods do taste better when cooked with gas. The copy plan was extremely effective, with illustrations playing an important part. Chops, roasts, vegetables, cakes, were shown with human interest backgrounds, and with display heads carrying a competitive punch for the special benefit of electric range users. Here are a few examples of captions which led this "foods taste better cooked with gas" series:

"Roast beef that's really roasted (not steam stewed) because cooked in a ventilated GAS oven."

"Cooked vegetables with all the vitamins left in . . . waterless simmer cooking possible only on a GAS range keeps in all the vitamins lost by other ways of cooking."

"Boy! What Flavor! Steak broiled the only perfect way . . . with GAS! 2½ to 5 times as much heat in a GAS broiler . . . that's why GAS broils steaks instead of steam stewing them."

Each piece of copy in the series carried at the bottom a prominent signature cut, heralding the fact that "Foods taste better cooked with GAS—the exact heat to bring out the best flavor and preserve the vitamins in every food."

Down one side of each advertisement in this series ran a strip of short paragraphs, each illustrated by a small pen sketch. Copy took the "Did you know?" form: "Did you know that each food has just one heat at which it cooks best—and that GAS alone gives every one

Calendar

November

American Petroleum Institute—Annual Convention, Chicago, Ill., November 9-12.

Sixteenth Gas School and Conference—Iowa State College, Ames, Iowa, November 18-21 inclusive.

Mid-Continent Oil & Gas Association—Annual membership Meeting (Kansas-Oklahoma Division), Tulsa, Okla., November 20.

Twelfth National Exposition of Power and Mechanical Engineering—Grand Central Palace, New York, November 30 to December 5.

December

Mid-Continent Oil & Gas Association—Annual meeting of general Board of Directors, Tulsa, Oklahoma, December 15.

January, 1937

National Bottled Gas Association,—6th Annual Meeting, Waldorf-Astoria Hotel, New York City, N. Y., January 20.

American Society of Heating & Ventilating Engineers—Hotel Statler, St. Louis, Mo., January 25-27.

June, 1937

Canadian Gas Association — 30th Annual Convention, Chateau Laurier Hotel, Ottawa, Canada, June 10-11.

Samples of Seattle Gas Co.'s "Foods Taste Better" and "Compare" advertising series.

of the temperatures needed for perfect cooking?" "Did you know that low even-temperature prevents meats from shrinking, and that only a GAS range gives really even oven temperature?"

Copy in this series spoke out frankly on inherent disadvantages of electric cookery, though it avoided using the term electric. For instance the column above carried the line: "Did you know that a chart of the temperature of 'other automatic ovens' looks as jagged as saw teeth, and that this reveals that the temperature in such an oven is constantly fluctuating up and down—with a variation of as much as 50 per cent?"

General interest and traceable results from this "Foods taste better cooked with gas" series persuaded the Seattle Gas Co. that its method of bidding for attention was sound, so out of it grew the "Compare" campaign, following essentially the same tactics but carrying the battle even more definitely into the enemies' camp. Each advertisement in this series led off with the word "Compare," in giant letters, and summed up at the bottom of each message with the statement: "You too will choose modern GAS cookery."

Six of seven main points of comparison were selected for the series. Each advertisement gave detailed attention to one point, and a panel down the side of each summed up the remaining half a dozen points favoring the modern gas range. Cooking results, speed, time-releasing features, popularity, first cost, installation cost, and upkeep were the chief points dealt with. As a tie-in with the previous campaign each of these panels in the second series concluded with . . . . "and — Foods taste better cooked with GAS."

This "Compare" copy minced no words on various competitive points. To illustrate, on the question of first cost the Seattle price lists of manufacturers making both gas and electric ranges were quoted, to substantiate the statement that "You'll save one-third the purchase price when you buy a modern GAS range." Freedom from extra costs in installation was also emphasized in this particular advertisement. On the subject of popularity the Seattle figures were submitted from government sources, showing gas with 13 per cent more range users than "any other comparable fuel" in the city.

During this "Compare" campaign all salesmen and contact men of the company wore a 2-inch celluloid button with the word "Compare" appearing on it in large letters. For one week preceding the campaign proper the company used 24-sheet posters carrying just the word "Compare" and a large question mark below. Then, a week later, copy was posted in place of the question mark, showing a modern housewife and a modern gas range, with the campaign caption: "You too will choose modern GAS cookery."

To indicate that the Seattle approach to its competitive situation was a sound one, the sales results of 1935 can be compared to those of 1936, bearing in mind that 1935 itself was 100 per cent above the year preceding in sales volume. For the first six months of this year, during which the "Foods taste better" and the "Compare" campaigns were run, sales came to $191,770, as compared to $135,780 for the same period of 1935. In the six-month figures were 742 gas range sales for 1936 as compared to 520 for 1935.

These two successful advertising efforts in Seattle indicate that there are situations where it pays to deal plainly with the competitive fuel issue. When gas cooking equipment and electric cooking equipment are submitted to fair comparison the gas industry can safely leave the conclusion to the customer . . . . but the comparison must be fair, and sometimes the only way to insure that is to make it yourself!

STEAM PLANT CHANGE-OVER

from Oil to Gas Improves Thermal Efficiencies as Seen in Results Secured for Chicago Consumer

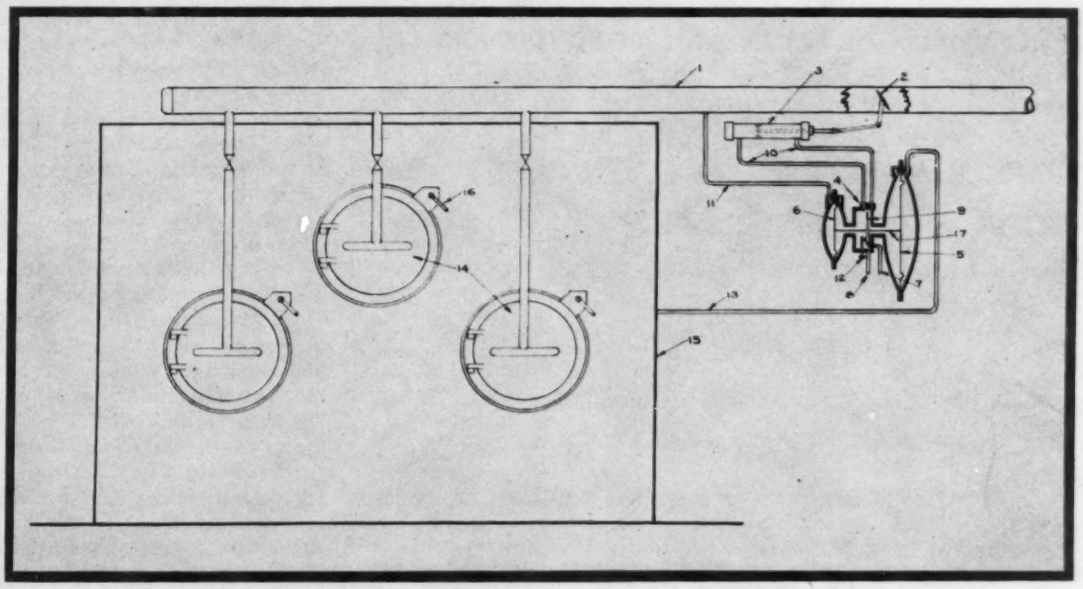
By WILLIAM M. RIACH, Jr.

Industrial Engineer, The Peoples Gas Light and Coke Company

STEAM has played a most important role in the history of mankind. Today it enters directly or indirectly into each of our lives, playing a minor or major part as the case may be. An industrial sales engineer with any utility serving communities where natural or mixed gases are available, will find that steam plays a major part in his sales activities, for large volume steam generators are users of large quantities of fuel, and naturally become potential gas users which must not be overlooked. The potential gas boiler load in any community will vary widely, depending on many factors each of which must be given its proper weight in analyzing the available market. It is essential for the utility to carefully determine the market factors locally present before deciding to sell gas for boiler fuel. It is not intended to discuss these factors in this article, although much could be written on them. Much information on rates and market studies has been published and is available to anyone interested in these phases of the gas business.

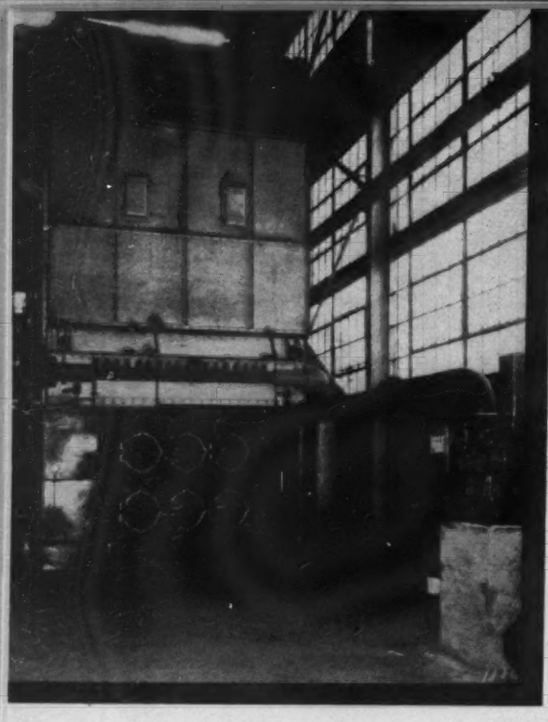
Let us preferably take the case of a change-over of a steam plant in Chicago from a crude fuel to city gas. This plant embodies some features which are somewhat unique, both from the view point of the power plant engineer and from that of the gas engineer. It is felt, therefore, that a discussion of our experience in this conversion installation should prove of value to other industrial gas men.

The two boilers converted to gas are four drum bent tube type high pressure water tube boilers. The smaller of the two boilers has 3,534 square feet of heating surface, and is rated at 353 B.H.P. It is designed for 175-pound pressure, but is normally operated at 125-pound pressure. It has approximately 1,900 cubic feet combustion space below the first pass. The boiler setting is completely enclosed in steel panel casings, and the front and side walls are water cooled. Insulating material 4½ inches thick is located between the outer boiler casings and the 18-inch fire brick combustion furnace linings. A venturi type stack 48 feet high with a top opening 4 feet in diameter contains the induced draft fan in its base. Final stack temperatures average around 525° F. CO_2 averages around 10 per cent on city gases, which is close to the theoretically desired percentage. A duplex type 14 feet by 8½ feet by 12-inch steam driven feed water pump supplies feed water to the boiler at a temperature closely approaching 212° F. Only about 15 per cent of the feed water comes from re-



(1)—Gas Header
(2)—Regulating Butterfly Valve
(3)—Regulating Cylinder
(4)—Distributor
(5)—Air Diaphragm
(6)—Gas Diaphragm
(7)—Oil Supply Pipe
(8)—Oil Return Pipe
(9)—Oil Jet Pipe
(10)—Oil Piping
(11)—Gas Pressure Piping
(12)—Ratio Adjusting—Slider
(13)—Air Pressure Piping
(14)—Gas Burners
(15)—Boiler Windbox
(16)—Burner Louvre Lever
(17)—Jet Push Pin

FIG. 1. Diagrammatic sketch of gas-air mixture control equipment.



● View of windbox, burners, gas header, rings, plug cocks and control board on 565 H.P. boiler.

covered condensate which is collected in a 16-inch header; the balance is supplied from city mains and is subjected to a chemical water treatment. After experimentation, it was determined what definite amount of a stable chemical should be added in an amount directly proportional to the load carried on the boiler. This chemical treatment in conjunction with a continuous boiler water filtering process, which consists primarily of a tank containing a filter bed of noncorrosive metallic slag, assures an unusually clean feed water condition, to is opened up for inspection but once a year. At none of the annual inspections has it been necessary to turbine the tubes which are practically scale free. Both forced and induced draft fans are utilized, and air for combustion is preheated to a temperature of approximately 350° in a tube type pre-heater. The pre-heated air is handled from the pre-heater, through an insulated metal duct to the boiler front, where a windbox 10 inches deep is located and serves as a partial housing for the burners supplying fuel to the boiler. The boiler is automatic in regulation. A variation in steam pressure of from 2½ to 3 pounds either way from the desired working pressure either opens up or throttles a master steam regulating valve, which in turn, through a system of levers and fulcrums, raises or lowers a series of weights which control the rheostats governing the speed of the direct connected variable speed motors, operating the induced and forced draft fans. In addition, a hydraulically operated damper regulator is used, which maintains a draft of approximately .04 inches in the fire box, irrespective of rate of fuel supply. This regulation has two purposes. First, it maintains a uniform negative pressure in the fire box, thus minimizing infiltration losses, and second, through maintaining the uniform negative pressure, there is provided a definite head for the wind-box pressures to work against, thus making the wind-box pressure a measure of the air supply.

The larger boiler has 5,800 square feet of heating surface, and 2,600 cubic feet of combustion space; essentially the same construction holds and the same general type of operating controls are used. Both of these boilers supply steam for forging work. In the case of the smaller of these boilers, steam is used on one 500-ton forging press, and 12 steam hammers ranging in size from 1 to 8 tons. The larger boiler supplies steam for three steam hydraulic forging presses of 1,000, 1,500 and 2,500 tons respectively.

One most unusual feature of this type of manufacture is the wide variation in steam demand which, in the case of the forging presses, ranges from a stand-by demand of 40 per cent of rating, to 350 per cent of rating when the three hydraulic presses are simultaneously in operation. These wide variations in steam demand call for the best system of regulation obtainable, and the demands on the gas mains for fuel vary in direct proportion to the demand on the boilers. In order to be prepared to supply the maximum possible instantaneous demand and additionally take into consideration the normal fluctuations in pressure on our gas mains it was necessary, after a survey had been made of main conditions in the district in which the plant is located, to supply the customer with gas from a main normally used to distribute gas between holders in different locations within the city. This transfer main handles gas at a pressure of 4 pounds, but there are times when pressures drop as low as 2½ pounds, or go as high as 6 pounds. Thus, it is evident that we were faced with the problem of delivering a certain definite quantity of B. t. u.'s per unit of time which was subject to two variables —first, a variation of steam demand on the boilers, which was cared for with the controls already in use with the crude fuel, and second, a variation in gas pressure, making it necessary to set up a control which would increase or decrease our gas flow in proportion to a fluctuating gas pressure. After considering several possible "hook-ups," we finally decided to use a control the operation of which is fundamentally based on balancing pressures on two diaphragm regulators which are mounted on the same common shaft. A diagrammatic layout of this control may be seen in Fig. 1.

The operation of a ratio control system is best understood by following such an extent, in fact, that this boiler

TABLE NO. 1. DATA ON BOILER NO. 1, USING GAS AND OIL

GAS

	Hours Boiler in Use	Total Steam Produced in 1000 lbs.	Total Gas Used in M c.f.	Average B. H. P. Per Hr.	Therms Used Per 1000 lbs. Steam	Per Cent Eff.
	8	138.8	231	530	13.31	77.2
	8	176.4	291	676	13.19	77.9
	8	150.8	255	578	13.52	75.8
	8	158.4	262	608	13.22	77.6
	8	155.6	256	595	13.16	78.0
	8	144.4	240	554	13.28	77.3
	8	105.6	192	404	14.54	70.5
Total	56	1030.0	1727	Av. 565	Av. 13.4	Av. 76.6

Average Steam Pressure..... 150 lbs.
Average Feed Water Temperature..... 200°F.
B.t.u. per lb. of Steam.....1025

OIL

	Hours Boiler In Use	Total Steam Produced in 1000 Lbs.	Total Oil Used in Gals.	Av. B.H.P. Per Hr.	Gals. Oil Used Per 1000 Lbs. Steam	Per Cent Eff.
	8	116.8	1174		10.05	67.3
	8	158.4	1495		9.44	71.8
	8	154.4	1535		9.94	68.2
	8	155.6	1514		9.75	69.5
	8	142.0	1521		10.70	63.2
	8	167.6	1589		9.50	71.4
	8¼	173.6	1675		9.65	70.2
Total	56¼	1068.4	10503	Av. 582	Av. 9.84	Av. 69.0

through a typical cycle. By referring to Fig. 1. and following the numbers appearing in this sketch, no difficulty should be experienced in following such a cycle. Assume the control to be in a balanced condition with the air-gas ratio correctly proportioned. The butterfly valve in the main gas header is in the minimum flow position, which indicates that the steam pressure in the boiler is above the minimum set pressure. When the control is in such a balanced condition, oil is being continuously circulated by the oil pump through the oil supply pipe (7) and through the oil jet pipe (9), and flowing back to the oil reservoir through the oil return line (8). As the steam pressure decreases, the master steam regulator begins to open up and in so doing, speeds up the forced draft fan, which causes an increase in wind-box pressure. This increased pressure is exerted on the air diaphragm (5) causing the jet push pin (7) to move to the left, thus forcing the oil through the left orifice of the distributor (4), causing the piston in the regulating cylinder (3) to move to the right, opening up the gas butterfly valve (2) and thereby increasing the gas flow and pressure. This increased gas pressure is imparted to the gas diaphragm through the gas pressure piping (11) which exerts a counter pressure on the push pin, and in turn, the jet pipe is forced away from the left orifice of the distributor (4), and again assumes a balanced position. When the steam pressure reaches the maximum set pressure, the master steam regulator closes, and exactly the opposite cycle occurs, resulting in a diminished wind-box pressure and a correspondingly lesser gas flow.

The air-gas ratio may be changed by moving the ratio adjusting slider (12). This changes the oil jet fulcrum which results in a new relation between the two diaphragm pressures required to balance the control. This slider has a vernier scale, making it convenient to record various settings with respect to ratios and the respective flue gas analyses obtained and making possible a quick adjustment to any predetermined setting.

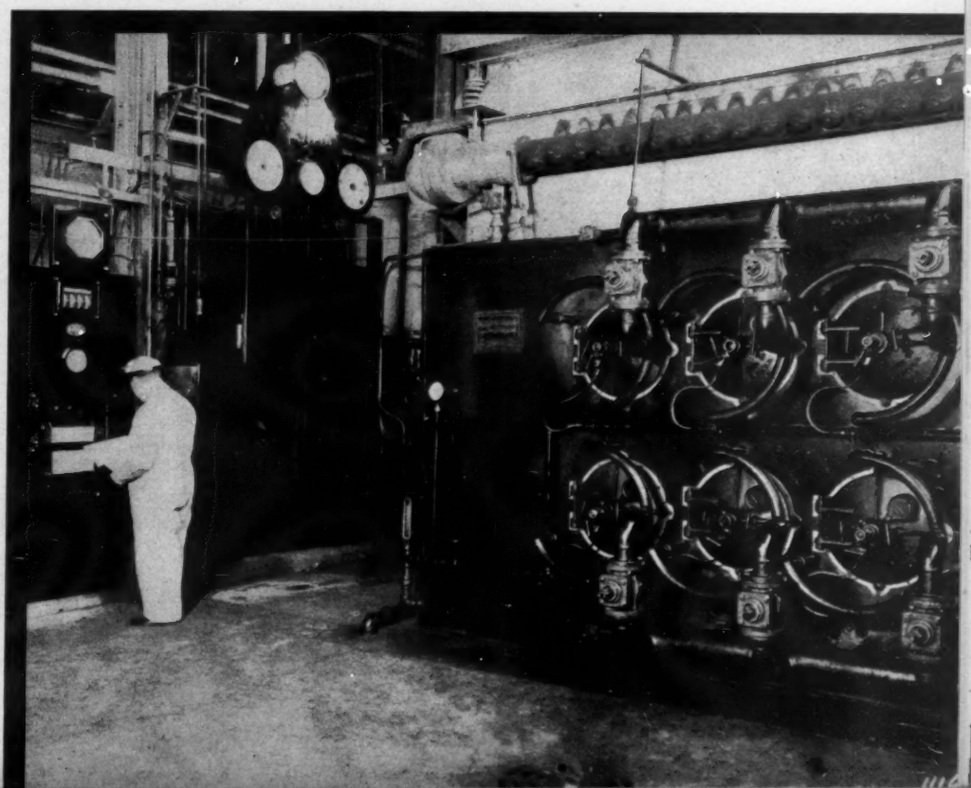
From the above description of the operation of the controls on these boilers, it is evident that any interruption in the electrical current would mean a stopping of the ratio control motor. If this were to occur at a time when the gas butterfly valve was open, there would result a condition in which the boilers would be filled with gas from main pressure without air being supplied for combustion, since the wind-box pressure would be reduced as soon as the steam pressure reached the point at which the steam pressure regulator begins to reduce the fan speed which controls the air supply to the burners. This would result in a rich mixture. In order to overcome the possibility of this happening we have incorporated in the gas header between the meter and the burners, a weighted gate valve which is held open by means of a solenoid. This solenoid is wired in parallel with the control's oil pump motor, and if the current fails, then the solenoid becomes de-energized and the gate valve in the gas line, which is heavily weighted, drops quickly, cutting off the gas supply. This valve must be reset manually so that if the current were to fail but momentarily and then come back on, it would not be possible to have air forced into the boiler which had been partially filled with city gas. These gate valves are tried out once a day in order to be certain that they are in good working order. During several months of operation, there has been no case in which they were required to function owing to electrical failure but nevertheless we regard them as an essential safety feature.

Two Connersville Rotary Meters with pressure volume integrators are used to measure the volume of gas supply to the boilers. All the boiler headers and burner drops are welded and lubricated plug cocks are used for individual burner shut-off valves. Each gas burner ring has a maximum capacity of 350 boiler horse power, or a rating of 21,000 cubic feet of 800 B.t.u. gas per hour, at a gas pressure of 2.5 pounds. The larger boiler has six such burners, and the small boiler has five. The load is usually carried with two-thirds of the burners.. When the load becomes heavy it is necessary for the boiler operator to cut in an additional burner manually. This, however, is about the only duty which the fireman must perform when the boilers are on gas fuel.

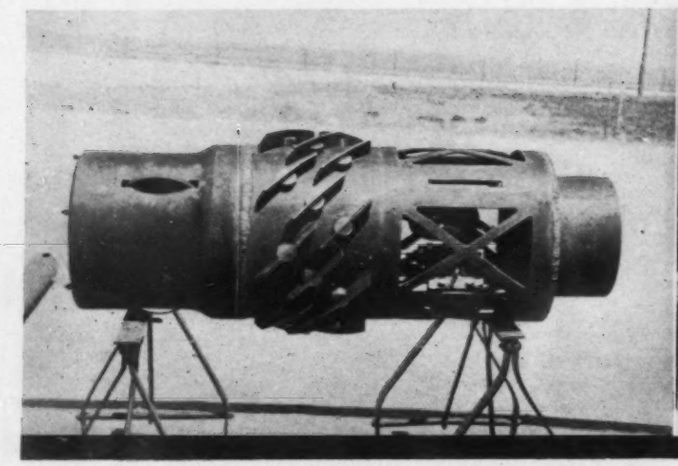
The conversion to gas fuel had been made but a short time when it was decided to conduct a week's run on one of the boilers to determine the relative efficiency of gas and oil under normal working conditions. At the time that this test was made, the normal operating schedule of the plant was eight hours per day, with a 16-hour hold-over load of less than 35 per cent of the normal boiler rating. The results obtained are given in Table No. 1.

The test has proved quite conclusively that a better thermal efficiency is obtained with gas fuel to carry the low points of the wide "swings" encountered in this plant, and give a resulting better combustion than oil. When the oil burners are throttled to a low point, the oil is not properly atomized, and it has a tendency to burn in the ash pit or to burn with a floating flame on the front face of the boiler. Comparable steam pressure charts on the two fuels show that variations in pressure are less in the case of gas, a closer regulation being obtainable with gas as fuel.

In conclusion, there are advantages with gas which bear no tangible evaluation, but are nevertheless appreciated by the user. These advantages may be listed as: (a) quicker starting, (b) soot blowing eliminated, (c) closer regulation, (d) a cleaner boiler room, and (e) less maintenance on the brick boiler setting. These two boilers have been operating for practically two complete seasons in the most satisfactory manner, and have not had at any time a minute's interruption.



● General view of 565 H.P. boiler; Connersville rotary gas meter with p.v. integrator is seen at right.



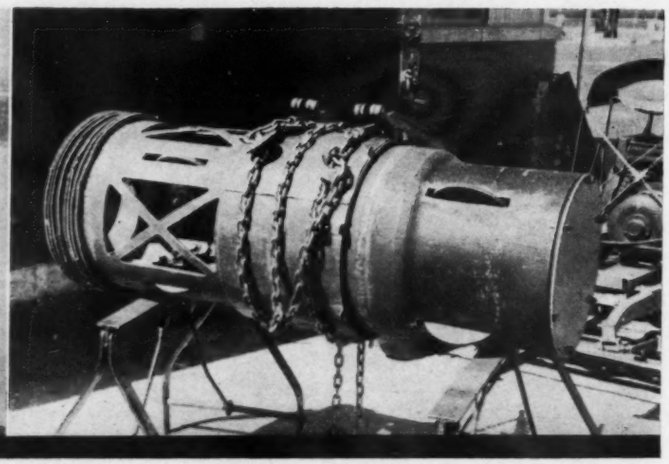


FIG. 1. (left) Improved 22-inch scraper. FIG. 2 (right) Twenty-two inch scraper with blade retaining band in place.

CLEANING NATURAL GAS LINES WITH AN INTERNAL

By FRANK J. TRELEASE

Ford, Bacon & Davis, Inc.*

THE development of the scraper described in this paper had its inception in the realization that the interior of the 22-inch pipe line transporting natural gas from the Amarillo, Texas field to Denver, Colo., was roughened and coated with corrosion products and with an accumulation of oil and dust and that it contained a considerable amount of water and oil, all with the result that its gas-carrying capacity had been materially reduced to such a point that the residual capacity was no longer sufficient to meet the expected peak demands, requiring that unless the capacity could be restored loops must be constructed or additional compressor facilities be provided. The carrying capacity of an 86-mile section of this line was increased from 85.9 per cent of normal to 106.7 per cent of normal by passing the scraper through it in only 11 working days without any interruption of service and with no out-of-pocket expense for labor, as the work was all done by the regular maintenance forces of the gas company.

The design of a go-devil for a gas line entails numerous difficulties particularly in the control of the speed of the scraper, which is not the same as that of the gas flowing through the line, and also difficulties in the removal of the loosened debris from immediately in front of the scraper so as to prevent clogging the line. This latter is of importance since the volume of material which might be cut loose by a scraper is of considerable magnitude, being sufficient to entirely fill a 22-inch line solid for 15 feet ahead of a scraper passing through only one mile of line containing a coating having only 1/64-inch average thickness. If this material were merely pushed ahead by the scraper it is quite probable that it would plug the line and it is therefore important that it be cut loose in a stream of high velocity gas moving past the scraper so as to carry the debris along well ahead. The gas can either pass through a circular orifice through the core, or out through a peripheril orifice and then through and around the cutting blades.

Based upon information and experience secured in the tests of the 8-, 14- and 22-inch experimental scrapers an improved 22-inch scraper was constructed which was used in the actual operation of cleaning the interior of the principal transmission line of the gas company. In the design of this new scraper a radical departure was made from the previous designs, in that even after a very considerable amount of wear the blades would be maintained in contact with the interior of the line pipe under definitely controllable and constant pressure exerted by coil springs.

In the new scraper the blades were placed at an angle of 45° to the longitudinal axis of the device and were of such length that their projected length along the axis of the scraper was sufficient to bridge any gap or opening between pipe ends in a Dresser coupling. Three rows of blades were provided, overlapping sufficiently to provide two complete scrapings of the interior of the pipe. The blades themselves were of tool steel, ¼-inch thick, edged with stellite.

The pressure of the blade springs would not necessarily be sufficient to support the weight of the entire device, and supporting wheels were accordingly provided at the front and rear ends of the scraper. These wheels were carried on spring mountings so that the device could pass through egged or buckled pipe, the springs being sufficiently heavy to carry the entire weight of the device on one front and one rear wheel and the flexible wheel supports were so arranged that the wheels could not be pushed entirely inside of the scraper, which would allow the scraper to slide along the pipe instead of rolling on the wheels.

The body of the scraper was composed of a piece of 20-inch outside diameter pipe and a 20-inch by 18-inch

*Portions of a paper presented before the Natural Gas Department, American Gas Association, Atlantic City, Oct. 26.

TRANSMISSION SCRAPER

swedge welded together, the purpose of the swedge being to reduce the diameter of the front of the scraper so as to provide sufficient clearance to permit the scraper to pass around bends in the pipe or breaks at the couplings. The body of the scraper was cut away to reduce the weight of the device which, when completed weighed approximately 800 lbs.

Fig. 1. is the device, complete except for the rubber squeegee discs which had not been bolted on the spindle at the rear end at the time the photograph was taken. Fig. 2. is the complete device including a sheet iron jacket around the blades, used to hold them close to the body of the scraper to facilitate inserting the scraper in the pipe line. Fig. 3. is a detail of the scraper blades, blade stems and blade springs while Fig. 4. is a detail of the middle portion of the scraper showing the blades in position. The pressure of the blades against the interior of the pipe was about 50 lbs.

A control valve and metering run assembly was constructed consisting of a 22-inch bull plug at either end of a short length of 8-inch line pipe in which were installed an 8-inch gate valve for controlling the flow of gas and a pair of orifice flanges for measuring the volume passed. This metering run was coupled into the pipe line in place of the joint of line pipe which had been removed in order to insert the scraper.

From a series of field line trial runs it was found that the starting pressure varied from approximately 4 lbs. to approximately 6 lbs. per square inch, depending presumably upon the condition of the interior of the pipe at various points. The pressure required to maintain the scraper in motion after it once started, was approximately 3 lbs. per square inch, at which pressure gas passed through and around the device at the rate of approximately 10,000 M cu.ft. per 24 hours.

The field line trial runs of the scraper indicated that this device could be counted upon to safely and successfully clean the interior of the 22-inch main line and that the velocity of the device could be controlled within reasonable limits by controlling the inlet volume of gas behind it. Accordingly, the scraper was put through the first 2¼ miles of this main line as a test run to determine just how it would perform in a badly fouled line and to develop any modifications which might be necessary for use under such conditions. When this main line was opened up it was found that, unlike the field line which was dry and comparatively clean when the scraper was tried out in it, the main line contained a considerable amount of fluid and was fouled with a heavy coating of sludge. The coating was slate gray in color and was damp and oily. It had a consistency very much like that of a mixture of sand, grit and butter at ordinary room temperature or somewhat harder, could be smeared down smooth by heavy pressure with the palm of the hand and much of it could be scraped off quite readily. The extreme highest projections were something like ¼-inch in thickness although the average thickness of the coating was something over ⅛-inch. The bottom of the pipe contained a layer of fluid about ½-inch deep.

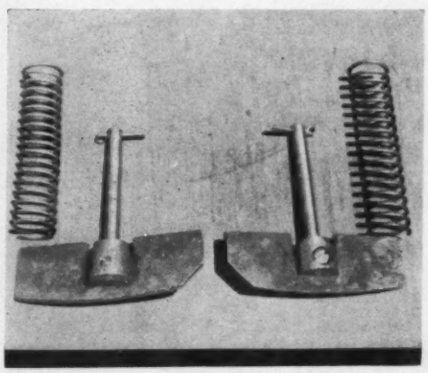


FIG. 3. Detail of scraper blades, blade stems and blade springs.

After the scraper had been inserted in the pipe, the control run was coupled into the line behind it and the pressure built up to 6.7-inch of mercury, when the scraper started moving. Gas was being admitted behind the scraper at that time at a rate of approximately 9,000 M cu.ft. per 24 hours and this rate was gradually increased to approximately 14,000 M cu.ft. per 24 hours by the time the scraper emerged from the end of the 2¼ mile section of line. The propelling pressure increased to 11½-inch of mercury during this time. The scraper travelled the 2¼ miles of line in 6½ minutes, or at an average velocity of approximately 21 miles per hour.

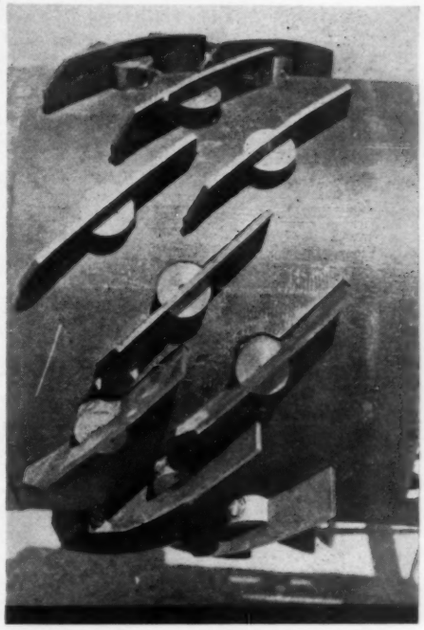


FIG. 4. Detail of middle portion of scraper showing blades in position.

The gas stream ahead of the scraper carried with it an appreciable cloud of oily fog but, as might be expected from the wet condition of the interior of the line, did not carry any dust. A considerable quantity of slush was found in the bell hole after the scraper emerged. The interior of the pipe at the end where the scraper came out showed evidence of having been recoated with a spray of slush carried in the gas stream behind the scraper, and when the line was given a thorough blowing out after the scraper had emerged, large quantities of slush were blown from it.

The scraper was again put through this same 2¼ miles of line and brought out a comparatively small amount of material, and a blow after this rerun failed to bring out any debris or slush, leaving the pipe only slightly coated with a slate-gray dust.

The scraper was next run through another section of line 2½ miles long which was traversed at an average speed of approximately 27 miles per hour. This second section terminated at a large, specially designed reservoir drip through which the scraper could not pass. When a joint of pipe was taken up immediately downstream or beyond this drip to introduce the scraper in the third section of line for the next run, it was found that the nature of the coating inside of the pipe was quite different from that which had been found up-

(Continued on Page 40)

INDUSTRY REVIVAL HERALDED

at 18th American Gas Association Meeting. Interest Is Centered Upon National Advertising and Exhibits

CONCLUDING one of the most successful years in its history—a year which saw the final realization of National Advertising and the founding of the Association of Gas Appliance and Equipment Manufacturers—the 18th Annual Convention of the American Gas Association came to a close, Friday, October 30 with the record showing that more than 5400 delegates had registered. Attendance at the convention eclipsed that of the Atlantic City meeting of two years ago by 1300 persons.

The 1937 Convention will be held during the week of October 11, 1937, at a place to be named later by the Association's board of directors.

Spurred by the impetus of economic recovery, the featured speakers, chairmen of the various committees, and officers of the Association stressed throughout the sessions that American industry was entering into a period of vast expansion, and that engineering research and aggressive salesmanship must capture these new loads for gas in the face of well organized competition. In line with this note of expansion, a high point in discussion throughout the sessions was the subject of national advertising. Commenting on this Herman Russell, the Association's newly elected president, said that the awakening of the industry and its march forward to bigger and better things is due in no small part to the adoption of widespread advertising plans inaugurated this past year.

A series of nation-wide regional meetings will be held this month by the A.G.A. and local gas companies to effect local newspaper advertising tie-ins with the national advertising compaign of the Association.

Convention elections introduced a new panel of officers and directors, on which are serving the following:

President: Herman Russell, president, Rochester Gas and Electric Corp., Rochester, N. Y.

First Vice-President: N. C. McGowen, president, United Gas Public Service Co., Houston, Texas.

Second Vice-President: Conrad N. Lauer, president, Philadelphia Gas Works Co., Philadelphia, Pa.

Treasurer: J. F. Rooney, assistant to executive vice-president, Consolidated Edison Co. of New York, New York, N. Y.

Directors (Two Year Terms): Charles W. Bennett, vice-president & general manager, Detroit City Gas Co., Detroit, Mich.; Henry L. Doherty, president, Cities Service Co., New York, N. Y.; O. H. Fogg, vice-president, Consolidated Edison Co. of New York, N. Y.; F. A. Newton, Commonwealth & Southern Corp., New York, N. Y.; James F. Pollard, president, Seattle Gas Co, Seattle, Wash.; William T. Rasch, president, American Gas Products Corp., New York, N. Y.; W. E. Steinwedell, president, Gas Machinery Co., Cleveland, Ohio; J. K. Swanson, vice-president & general manager, Minneapolis Gas Light Co., Minneapolis, Minn.; Percy S. Young, vice-president, Public Service Electric & Gas Co., Newark, N. J.

For Atlantic City Boardwalk convention personalities see snap shots on pages 17-18-19.

Natural Gas Department: Chairman—George E. Welker, president, United Natural Gas Co., Oil City, Pa.; Vice-Chairman—Robert W. Hendee, Colorado Interstate Gas Co., Colorado Springs, Colo.

Accounting Section: Chairman—Herbert E. Cliff, Public Service Electric & Gas Co., Newark, N. J.; Vice-Chairman—E. J. Tucker, Consumers Gas Co. of Toronto, Toronto, Ont., Can.

Commercial Section: Chairman—F. M. Banks, vice-president in charge of sales, Southern California Gas Co., Los Angeles, Calif.; Vice-Chairman—Hugh Cuthrell, vice-president. Brooklyn Union Gas Co., Brooklyn, N. Y.

Industrial Gas Section: Chairman—Ralph L. Manier, Syracuse Lighting Co., Syracuse, N. Y.; Vice-Chairman—Hale A. Clark, Detroit City Gas Co., Detroit, Mich.

Manufacturers' Section: Chairman—John A. Fry, president, Detroit-Michigan Stove Co., Detroit, Mich.; Vice-Chairman, Apparatus Division—Merrill N. Davis, vice-president, S. R. Dresser Manufacturing Co., Bradford, Pa.; Vice-Chairman, Appliance Division—J. Scott Fowler, president, Lovekin Water Heater Co., Philadelphia, Pa.

Publicity and Advertising Committee: Chairman—Henry Obermeyer, assistant to vice-president, Consolidated Edison Co. of New York, N. Y.

Technical Section: Chairman—M. I. Mix, The Peoples Gas Light & Coke Co., Chicago, Ill.; Vice-Chairman—J. V. Postles, Philadelphia Gas Works Co., Philadelphia, Pa.

Beginning on Page 22 of this month's G A S will be found a number of digests in which outstanding convention papers are briefly summarized. Also, two papers presented before the Natural Gas Department are covered at some length: That by Frank J. Trelease on internal cleaning of pipe lines with a new type scraper appearing on Page 14, and that by J. S. Carey on the subject of polymerization, on Page 20.

Natural Gas Meeting

Natural gas subjects held the spotlight at the opening of the convention, with the Natural Gas Department conducting its general program Monday afternoon. The Department Main Technical and Research Committee held its annual meeting on the morning of the same day. At this committee meeting progress reports of the various committees were made and the matter of budgets for the coming year was also discussed, together with the continuance of the research work during the coming year.

Among the projects to be extended is that pertaining to gas-oil ratios in the proper conservation of both gas and oil in production stages. This work represents an extension of the program as already reported in Monograph No. 7 This program is being conducted jointly by the A.P.I., Bureau of Mines and the A.G.A.

The study of the formation of hydrocarbon hydrated in pipe lines will also be extended, with this including an extension of field research work involving the analysis of hydrates as formed in the lines, the extension of temperature surveys, and the study of the different types of soil affecting temperature. The object of the reasearch will be to study the various conditions where hydrates have been formed, so that all companies can have the benefit of the experience, and facts about the treatment of the problem.

Attendance at the accounting sessions held on Tuesday and Thursday after-

(Continued on Page 56)

GAS CAMERA

Along Atlantic City's Boardwalk With A. G. A. Convention Delegates

IN AN ATLANTIC City wheelchair are C. J. Rogers, sec., Crown Stove Co.; Floyd Carmichall, division mgr., Lone Star Gas Co. CENTER: Philip G. Gossler, president, and W. C. Beckjord, vice-pres. and gen. mgr., Columbia G. & E. Co. SOUTHERN POWER moves Lacy Byrd, Lone Star Gas Co.; Thomas E. Bullion, sales director, Detroit-Michigan Stove Co.

THREE OF a kind: W. Howard Pape, mgr., Oil Sales; Paul Bauiman, mgr., New York Branch; John Tancred, Oil Sales Department (Dallas), all of the Crane Co. FOUR GENTLEMEN in overcoats: Street W. Russell, Southern sales mgr., Peerless Manufacturing Corp.; W. H. McInnis, gen. sales mgr., Memphis Power & Light; J. S. Drillette, vice-pres., Peerless Manufacturing Corp.; Curtis Allen, Mobile Gas Co.

WALKING IN the wind are Robert W. Hendee, vice-pres., natural gas dept., Colo. Interstate Gas Co.; William Moeller Jr., vice-pres., natural gas prod. and trans., So. Calif. Gas Co.; F. T. Parks, mgr., Natural Gas Dept., Public Service Co. of Colo.; E. A. Clark, vice-pres., The Manufacturers Light & Heat Co.; Clarence H. Waring, chief engineer, Kansas City Gas Co.

Boardwalk

(Read from

HOOSIER HUDDLE: George V. Bennett, div. mgr.; LeRoy Clements Heavner, gen. supt. of gas; W. E. Nichols, supervisor gas operations; Thos. J. Kelly, div. mgr.; G. M. Johnson, general gas supt., all of Northern Indiana Public Service Co., and Phil Ryan, Midland United Co.

CALIFORNIA COUPLE: Norman R. McKee, vice-pres., Southern Counties Gas Co., and Wm. Moeller Jr., vice-pres., natural gas prod. and tran., Southern Calif. Gas Co. THREE MEN on a walk: Wm. J. Hill, sales mgr., Detroit-Michigan Stove Co.; L. R. Foote, ind. gas eng., Central Illinois Electric & Gas Co.; R. L. Cox, Detroit-Michigan Stove Co. AMERICAN METER Co.'s Chief Engineer John H. Diehl and President F. H. Payne.

STRIDING and smiling: L. L. Baxter, operating manager, Arkansas Western Gas Co.; James H. Satterwhite, mgr., Westcott & Greis; F. D. Bradley, pur. agt., Southern Union Gas Co. MIDDLE-WESTERNERS: Fred Armbruster, supervisor, gas utilities, Middle West Corp.; James F. Orr, vice-pres., and Mel Rodgers, mdse. mgr. of Central Illinois Public Service Co.

SOUTHERN gentlemen: W. H. McInnis, gen. sales mgr., Memphis Power & Light Co.; L. M. Taylor, residential sales mgr., Mississippi Power & Light Co. COMING straight ahead: G. A. McDonough, of Home Gas Industries, Chicago, strides along with H. P. Mueller, of the L. J. Mueller Furnace Co. IN THIS CORNER are Linden Stuart, Wailes Dove-Hermiston Corp., and E. V. Kesinger, gen. supt., Natural Gas Pipe Line Co. of America.

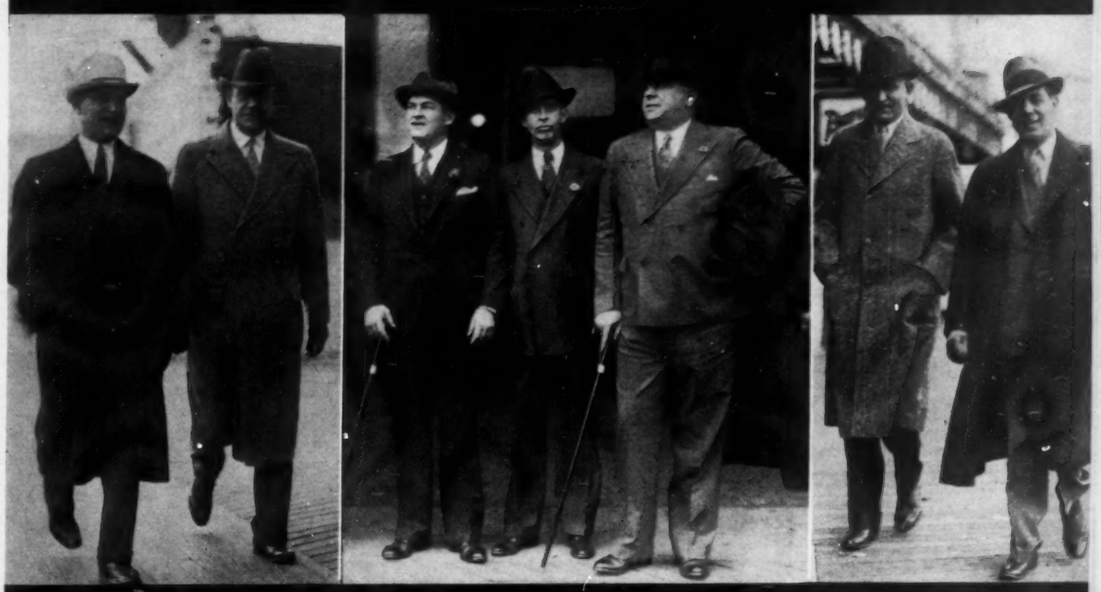
Personalities

Left to Right)

LEFT: J. D. Creveling, pres., Panhandle Eastern Pipe Line Co. HAPPY GROUP: M. W. Welty, adv. mgr.; H. Emerson Thomas, Eastern rep.; K. W. Rugh; A. B. Cameron, sales mgr.; Philgas Dept., all of Phillips Petroleum Co. BUSY Merrill N. Davis, vice-pres., S. R. Dresser Manufacturing Co.

TEXAS TRIO: Ben R. Newbery, pur. agt.; Eugene C. Whitcomb, new business mgr.; D. A. Sillers, meas. supt. Lone Star Gas Co. KANSAS CONVENTIONEERS: Clarence H. Waring, chief eng.; Major. T. J. Strickler, vice-pres. and gen. mgr., and Ray T. Ratliff, of Kansas City Gas Co.

COLD HANDS have Karl B. Nagler, Systems Development Eng.; Martin I. Mix, supt. of distr., The Peoples Gas Light & Coke Co. WITH CANES: L. A. Dixon, vice-pres., and R. V. Burnette, of Pittsburgh Equitable Meter Co., and Carl J. Minnig, supt. gas division, Phillips Petroleum Co. RIGHT ARE A. W. McKinney, sales mgr.; F. A. McMurray, div. sales mgr., The National Superior Co.



ROBERTSHAW Thermostat Co.'s vice-pres. and gen. mgr., John A. Robertshaw, and Sales Mgr. H. T. Ryan. VICE PRESIDENTS Chester L. May, of Community Natural Gas Co., and D. A. Hulcy, of Lone Star. PRESIDENTS J. C. Clark, of E. F. Griffiths Co., and W. P. Hutchinson, of Sprague Meter Co.

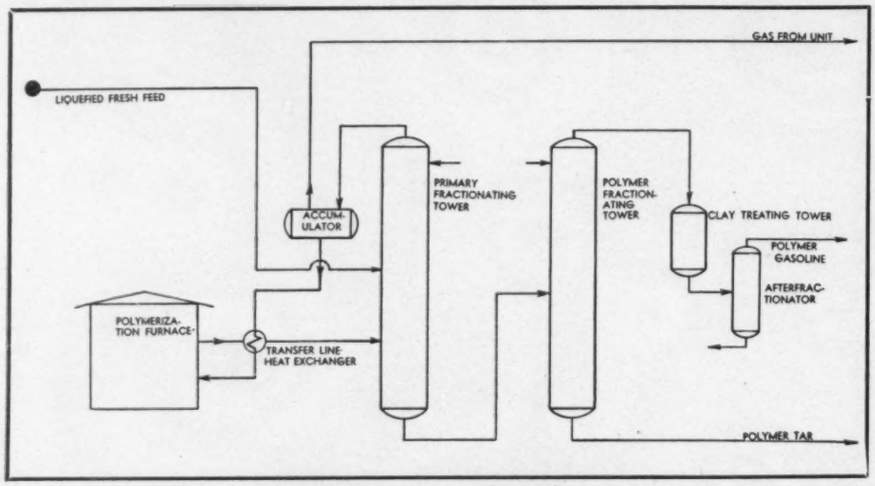


FIG. 1. Polymerization unit, partial recycling operation.

By J. S. CAREY
The M. W. Kellog Company
New York City

COMMERCIAL ASPECTS OF

THE process here considered, and designated as the unitary thermal process, is licensed by the Polymerization Process Corp., through its licensing agent, The M. W. Kellogg Co., under the patents applying to this process of the Phillips Petroleum Co., the Standard Oil Co. (Indiana), Standard Oil Development Co., The Texas Co., and the M. W. Kellogg Co. Plants utilizing this process are constructed by the M. W. Kellogg Co.

The unitary thermal polymerization process employs no catalyst, accomplishing the conversion by the use of heat and pressure in a single continuous conversion coil. It can utilize as charging stocks either entirely saturated hydrocarbons as obtained from natural gas and gasoline operations, or mixtures containing appreciable quantities of unsaturates as obtained from refinery gas. The materials converted from these sources are principally C_3 and C_4 hydrocarbons.

In the commercial application of the unitary thermal polymerization process the optimum design basis for any specific application can only be determined by an economic appraisal based on conditions prevailing in the proposed locality. The principal difference in process arrangement lies in the degree of recycling of the C_3 and C_4 compounds introduced into the process as fresh feed. Under certain conditions, where a large excess of butanes is available, it may be found economical to retain for recycling only those components which are condensible at available, cooling water temperatures and permissible fractionating tower operating pressures. In many cases, however, appraisals have shown that a close approach to ultimate recycling of C_3 compounds is dictated by economic considerations, the percentage recovery of C_3s being arrived at by an economic balance to determine the point at which further recovery of C_3s for recycling will cost more than their replacement value.

The type of operation in which, due to local conditions, complete recycling of C_3s is not carried out, is illustrated in Fig. 1, representing the general process arrangement of a full scale commercial operation. In this unit the fresh liquid charge is introduced into the first tower of the fractionating system. In this tower C_5+ natural gasoline components of the fresh charge are substantially completely removed as bottoms, together with polymer liquid, while the overhead, consisting of C_4 and lighter from the fresh feed plus recycle constituents from the coil outlet, passes through a water cooled condensing system to the high pressure accumulator, which serves as a reflux accumulator for the first fractionating tower as well as furnace feed accumulator. The furnace feed pump takes suction from the high pressure accumulator, and the furnace charge passes through the cold side of a transfer line exchanger to the polymerization coil. The coil outlet is returned through the transfer line exchanger and thence through a reboiler located in the bottom of the first fractionating tower, whereby the reboiling effect for this

TABLE NO. 1—PROCESS BREAKDOWN, LEAN NATURAL GAS POLYMERIZATION CHARGE

	Original Raw Gas			Net Polymerization Feed**		Total Gas		
	Mol %	Mc.f.	MM B.t.u.	Mol %	Mc.f.	Mol %	Mc.f.	MM B.t.u.
H_2						0.3	3	0.9
CH_4	88.9	889	901			91.8	932	946.0
C_2H_4						0.4	4	6.5
C_2H_6	5.9	59	105			7.2	73	130.0
C_3H_6								
C_3H_8	3.4	34	87	63.3	31	0.3	3	7.7
C_4H_8								
C_4H_{10}	1.8	18	60	36.7	18			
C_5+								
Total	100.0	1000	1153	100.0	49	100.0	1015	1091.1*
	Sp. Gr. (Air = 1) = 0.64					Sp. Gr. (Air = 1) = 0.59		

Polymer Yield, Gallons

Polymer Gasoline	480
Polymer Tar	40
Total Polymer	520

*B.t.u./C.F. = 1075.
**Based on 90% C_3 recovery.

POLYMERIZATION holds interest for the gas industry, since natural gas is one source of raw materials for the process. Mr. Carey deals here with commercial aspects of polymerization, his remarks being summarized from October addresses before the Western Petroleum Refiners Association and the American Gas Association.

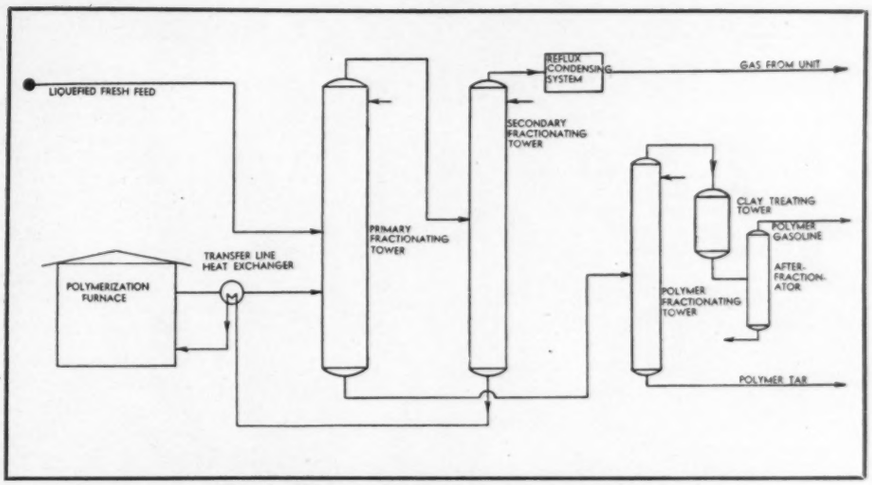


FIG. 2. Polymerization unit, recycling operation.

THERMAL POLYMERIZATION

tower is obtained, following which this material is introduced into the mid-section of the first fractionating tower. C_4s and lighter are removed overhead to the high pressure accumulator as previously described, while the polymer liquid together with natural gasoline from the fresh feed is transferred from the botttom of this tower to the second fractionating tower. Gas is vented directly from the high pressure accumulator and this gas consists of the gas actually made in the conversion furnace plus fresh feed constituents as determined by the equilibrium temperature and pressure conditions on this accumulator.

The function of the second or low pressure fractionating tower is to separate polymer gasoline to desired endpoint specifications overhead, while any tar produced is removed as a bottoms product. The gasoline overhead passes through a clay treating system, a clay polymer separator, and thence to storage.

Fig. 2 shows the modification of the system previously described to permit the nearly complete recycling of C_3 material to the polymerization coil. This is accomplished by the addition of a secondary fractionating tower to the process arrangement of Fig. 1. The function of the secondary fractionating tower is to retain all of the C_4s and a large percentage of the C_3s (based on fresh feed), as bottoms, comprising the coil feed. The overhead, representing the total gas from the unit, consists principally of C_2 and lighter hydrocarbons, with a small quantity of C_3s material. The retention of C_3s for recycling requires generally lower temperatures than obtainable with cooling water, hence units of this design are equipped with refrigeration systems for refluxing the secondary tower.

Polymerization of components present in natural gas has received considerable attention due to the enormous gross supply available. The bulk of the natural gas supply, unfortunately, must be classified in the lean category with respect to the higher constituents. This necessitates the handling of extremely large quantities of gross material in order to secure any appreciable quantity of polymerization unit charge. It is apparent that a number of major factors influences the economic possibility of utilizing natural gas as a source of polymerization charge. These may be summarized as composition of gas, cross quantity of gas available, available well pressure and estimated maintenance of pressure, estimated life of the field, legal aspects affecting disposal of the gas rejected from the preliminary recovery and polymerization operations, and prevailing price structure.

An economic problem is involved in the recovery of polymerization charge constituents from original gaseous feeds containing large percentages of methane and lighter. To permit ready visualization of approximate overall yields obtainable commercially from several types of gross raw gaseous feeds, process breakdowns have been tabulated in Tables No. 1 and No. 2 based on typical lean natural gas, and rich natural

(Continued on Page 26)

TABLE NO. 2—PROCESS BREAKDOWN, RICH NATURAL GAS POLYMERIZATION CHARGE

	Raw Gas			Net Polymerization Feed*		Total Gas		
	Mol %	Mc.f.	MM B.t.u.	Mol %	Mc.f.	Mol %	Mc.f.	MM B.t.u.
H_2						0.8	13	4.2
CH_4	56.7	567	576			47.9	741	752.0
C_2H_4						1.2	18	29.4
C_2H_6	16.6	166	296			49.1	226	402.0
C_3H_6								
C_3H_8	15.9	159	409	67.8	143	1.0	16	41.1
C_4H_8								
C_4H_{10}	6.8	68	228	32.2	68			
C_{5+}	4.0	40	159					
Total	100.0	1000	1668	100.0	211	100.0	1014	1228.7
	Sp. Gr. (Air = 1) = 0.97					Sp. Gr. (Air = 1) = 0.80		
	B.t.u./C.F. = 1668					B.t.u./C.F. = 1210		

Polymerization Yield, Gallons

Motor Fuel**	3470
Polymer Tar	180
Total Liquid	3650

*Based on 90% C_3 recovery.
**9-11# R.V.P., 400°F. E. P., polymer plus natural gasoline.

Radio Communication for Normal And Emergency Dispatching

● **K. KENDALL BERLYN, Northern Indiana Power Co., Kokomo, Ind.; Addressing Technical Section, Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by G A S).**

IN recent years the loss in revenue due to service interruptions has not been the major consideration of public utilities. The varied and indispensable uses for which gas and electricity have been employed makes service continuity an absolute necessity.

The attitude which the typical utility man maintains toward service interruptions has been developed as a result of experiences which have seriously inconvenienced the consumer. The earnest efforts to restore service following outages is not appreciated by the general public nor the customers affected. There have been numerous devices developed to localize trouble on transmission and distribution systems to small sections. However, little progress has been made toward the prompt dispatching of repair crews to the location of the trouble. This is due almost entirely to the absence of communication facilities.

Difficulty in locating and dispatching crews during emergency conditions prompted the thought of a more adequate means of control. Radio naturally suggested itself for this purpose as no other known method is available for communicating with mobile units.

The radio system developed by the Northern Indiana Power Co. is summarized by the following points:

1. A signal to attract the attention of the car operator.
2. Immunity from temperature variation.
3. A selective feature to permit the calling of any one car wanted from a large fleet utilizing but one carrier frequency.
4. Freedom from interference due to lightning, power lines, and other radio stations.
5. Freedom from "blanket" effects, which would tend to produce false signals to cars close to the transmitter when a more remote car is signaled.
6. A simple and reliable supervisory system assuring dispatcher or operator of correct transmitting conditions.
7. An equally simple receiver free from adjustments while calls are in progress.
8. Standardized equipment and parts.
9. Costs, in terms of capital investment, operation and maintenance, are such that the system may be widely adopted.

As an optional signal instead of the horn blast, a light behind a red bull's eye is located in the cab of the truck. This visual signal is intended for use while driving, and when parked near hospitals or quiet zones. Either of the above types of signals would be followed by instructions or orders by voice, which would be received in the usual manner.

The transmitter or station used is similar to all those used for police and broadcast purposes. Integral with, and attached to the speech amplifying equipment, is an audio frequency tone oscillator. The circuit and basic principle utilized in this oscillator and another of identical characteristics connected to the receiving equipment are now pending patent. It is to this development that the system owes its success. This oscillator produces perfectly stable audio frequencies at any selected value between 1,000 and 2,000 cycles per second. Each receiver is adjusted to receive some frequency within this range. In operation, the frequencies are automatically determined by a pre-selector controlled by the station operator in a manner as simple as placing a call on an automatic telephone system.

The signal transmitted from the station is on the air for only one second, but the horn on the car will continue to blow until stopped by the driver. Following the transmission of the initial signal at the station the operator waits a length of time sufficient for the driver to reach his car. Tests have shown that one or two minutes is ample in the majority of instances. After this pause the operator depresses the microphone key and proceeds to issue instructions in the customary manner.

The receiving set used on the car is a standard automobile radio altered slightly to adapt the control arrangement and permit tuning to the proper wave length. Once the radio is installed in the car and tuned to the proper wave length it is locked in that position and both volume and tuning controls removed. A control box is connected to the receiver through a metal sheathed cable and attached to the dash of the car. This cable connects to both the receiver and control box by a multiple contact plug which can be instantly disconnected thereby facilitating the removal of either part for servicing or replacement. Within this control box are located the master switch for turning the receiver on and off, and a three position switch for the optional reception of the signal, namely: horn, speaker or bull's-eye and a push button for interrupting the horn blast.

The cost of a radio phone transmitter will vary with the power in watts. It is thought that 50 to 150 watts of power output is sufficient for a coverage of from 10 to 25 miles. A station of this power equipped with the selective system will vary in cost from $800 to $2,000. The receiving equipment including the selective apparatus will cost from $127 to $150 per unit. If two-way communication is desired the overall cost will vary between $200 and $225 per set. The maintenance cost for replacements, etc., for a low power station when put to severe use, should not exceed $100 per year. The maintenance cost of the receiver will not be much in excess of a standard automobile radio.

Identifying Small Concentrations Of Explosive Gases

● **S. J. MODZIKOWSKI, The Peoples Gas Light and Coke Co., Chicago, Ill.; in report to Chemical Committee, Louis Shnidman, Rochester Gas and Electric Co., Rochester, N. Y., Chairman; presented to Technical Section, Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by G A S).**

A SAMPLE of the dry contaminated atmosphere is first measured in a Haldane Burette over mercury. After this, the carbon dioxide and other alkali soluble gases are removed. The remaining sample is burned by slow combustion and the contraction and carbon dioxide are measured. From these data, the ratio of the contraction is then compared to similar ratios of known gases, such as coke oven gas, carburetted water gas, natural gas, producer gas, reformed gas, sewer gas, propane gas, butane gas, gasoline, and benzol. From this comparison, the identity of the unknown gas is determined. Each type of gas has a different ratio, due to the variation in composition. To use this method, it would be first necessary to determine such ratios for each of the gases named above, or other gases encountered in this work.

In employing the above method, it is important to know whether the contaminated sample of atmosphere is explosive before introducing it into the Haldane Burette in order to avoid damage to the combustion tube. This could readily be determined by passing some of the sample into any type of explosion

pipette. If it is found to be explosive, the above procedure is changed as follows: The carbon dioxide and oxygen are both absorbed and then the remainder of the sample is burned by passing it into a slow combustion tube which contains a measured amount of oxygen. In this case, the use of a Haldane Burette is not feasible. A Bureau of Mines Orsat Burette is best suited for this purpose.

In addition to determining the contraction and carbon dioxide ratio, it is helpful and often necessary to make other tests, such as a complete analysis by means of the Bureau of Mines Burette, and also a test for carbon monoxide by means of the Iodine Pentoxide apparatus. A complete analysis is necessary for samples taken from sewers, manholes, and similar places, because gases leaking into these places change in composition when in contact with the soil. This, of course, will change the ratio of the contraction to the carbon dioxide and will give misleading results. However, analysis of the gas sample by means of the Bureau of Mines Burette will give the general composition of the gas and thus aid in its identification.

When analyzing atmospheres contaminated with inflammable vapors such as gasoline, kerosene, benzol, etc., which are often found in sewers, analysis by means of the Bureau of Mines Burette is misleading, since these vapors are soluble in fuming sulphuric acid and other absorbing solutions. For analysis of such samples the contraction-carbon dioxide methods is best suited.

A test by means of the Iodine Pentoxide apparatus would help to distinguish gasoline and benzol vapors from fuel gases which contain carbon monoxide. A similar test would also help to distinguish propane, butane, and natural gas from manufactured gases containing carbon monoxide. However, a test by the Iodine Pentoxide apparatus cannot always be relied upon if the sample of atmosphere is taken under the following conditions:

1. If the sample of atmosphere is taken after a fire or an explosion, the air is invariably contaminated with carbon monoxide due to incomplete combustion of any carbonaceous material.

2. If the sample of atmosphere is taken in a sewer or manhole where there are electric cables since short circuited or overheated cables distill off hydrocarbons and carbon monoxide from the bituminous coverings.

A very careful interpretation must be made of results of analyses of samples of atmosphere taken from sewers or manholes following fires or explosions because of the great change in composition of the atmosphere which occurs in such cases.

TABLE NO. 1. RATIOS FOR COMMON INDUSTRIAL GASES

The following table shows the theoretical ratio for the contraction divided by the carbon dioxide for all of the common gases concerned in this work.

In further shows the minimum value for this figure which can be obtained for any one gas when both of the observations are made within .01%, and in addition it shows the maximum value which can be obtained within this limit of error.

Gas	*Theoretical*	*Minimum*	*Maximum*
Benzol	.42	.42	.42
Gasoline	.87	.87	.88
Producer	1.20	1.13	1.28
Natural	1.81	1.78	1.83
Water	1.99	1.93	2.06
Sewer	2.00	1.96	2.04
Artificial	3.36	3.27	3.47
Coke Oven	3.82	3.70	3.95

At times, sewer gas is found in small concentrations in manholes, ducts, and basements. This gas is ordinarily composed of carbon dioxide, methane, and sometimes hydrogen sulphide. Sewer gas is distinguished from natural gas in atmospheric samples when the analysis shows the presence of large amounts of carbon dioxide and the absence of ethane. It is likewise distinguished from manufactured gas when the analysis of the sample shows the presence of carbon monoxide and hydrogen. A test for hydrogen sulphide would also help to differentiate between sewer gas and other gases.

When collecting samples of atmosphere, it is important to note the presence of any foreign odors, the proximity of underground pipe lines, and cables, and the presence of liquids and their odors. These observations will oftentimes aid in identifying the gas and in determining the best method of analysis.

Table No. 1 shows the contraction-carbon dioxide ratio for the principal combustible gases encountered.

The Installation and Servicing Of Kitchen Heaters

● **DAVID W. PRICE, Connecticut Light and Power Co., Waterbury, Conn.; addressing Operating Division Meeting, New England Gas Association, Hartford, Conn., October, 1936.—(Abstract by G A S).**

GAS kitchen heating is accomplished generally by the use of the two purpose gas range, and the conversion of the existing coal heating equipment to the use of gas. The installation of this equipment presents problems worthy of note.

Two Purpose Range: The two purpose range is a factory assembled unit, and its installation is not unlike that of an ordinary cooking range. Its location in the kitchen will be dictated by the location of the chimney flue opening, so that the length of flue pipe to be run will be as short as possible.

There are two general types of room thermostats supplied by the manufacturer with two purpose ranges, which use either the throttling or snap action principle. Since much of the success of the installation from a customer viewpoint will depend upon the proper operation of the thermostat, due attention should be given to its location and installation.

Conversion Equipment: The conversion of a kitchen coal range to automatic gas heat presents problems not associated with the installation of a two purpose gas range. The efficiency of a gas designed kitchen range cannot be equalled, in conversion jobs, but can be closely approached.

The luminous flame type of burner, controlled by either the snap action or throttling type thermostat, is the one most commonly used for conversion installations. It is simple, quiet, easily applied and free from the usual troubles of blue flame burners. It can be purchased as a factory-assembled and tested unit with complete operating instructions, or can be assembled by the service department if departure from the regular type of controls is desired. The grates can be left in the range, but the fire brick lining should be removed, with the exception of the utility type gas range, in which the fire brick lining should be left intact to prevent possible damage to the exterior enamel. In the gas utility type ranges the burner can be installed from the front of the range placing the burner head in the ash box.

In the straight coal ranges the burners are best installed from the rear by drilling a hole through the back of the range fire box. The burners should be

securely fastened to prevent twisting, sliding or dropping out of position, and so located that the top of the burner tube is at least 1 inch above the bottom of the fire pot casting. It should be readily accessible for cleaning, inspection and adjustment. No part of the flames should impinge on the fire box walls or top of range.

Thermostats of the throttling type should be placed on or near the rear of the range and on the side opposite the fire box. Snap action type thermostats, with remote control, should be placed on the wall at about 5½ feet from the floor and at least 2 or 3 feet from the range.

The flue pipe from the range to the chimney should be replaced and equipped with a draft hood or its equivalent, which should be located at a point not lower than the top of the highest flue passage of the range, except in ranges where the direction of flue travel is reversed around the oven. In this case the draft hood should be located at least one foot higher than the top of the highest flue passage.

Where dampers are an integral part of the range they should be permanently secured in a wide open position, except such dampers, the function of which is to alter the passage of the flue gases around the oven. These should be locked in the position which allows the heat to pass around the oven, to take advantage of the increased heating surface.

The internal cross-sectional area of the flue pipe between the outlet of the range and the draft hood should be such as to provide not less than one square inch of flue area per 7500 hourly B.t.u. input. In no case should this section of the flue pipe be less than 3 inches in diameter. If flue pipe larger than the above indicated size is used, it should be restricted by use of an orifice plate or cone to the size indicated.

The hourly B.t.u. input for burners in conversion installations should range from 17,000 to 25,000 depending on conditions found. Baking in a coal range which has been converted to automatic gas heat is not generally successful, with the lower B.t.u. ratings on burners. It has been found that ratings as high as 34,000 hourly B.t.u. input are required for satisfactory results. In such cases it is necessary to supply a room thermostat which can be by-passed to allow the full gas input of the burner to be utilized.

In general, the service department is confronted with problems on kitchen heaters which fall into one of the following major classifications:

1. High Bill Complaints.
2. Improper Heating.
3. Faulty Operation of Burner and Associated Controls.

High bill complaints on kitchen heaters are often associated with the customers' attempt, to use the unit for heating all or part of the entire house, especially in the spring and fall. Another source of high bill complaints may be an inefficient installation, especially on conversion units.

Improper heating is usually due to poor heat distribution because of location of the range which, unfortunately, is fixed by the chimney opening. It can often be remedied by re-location of the thermostat sensitive element; in some instances a circulating fan might be justified.

Faulty operation of burner and associated controls is a matter of assembly, design, adjustment and choice of materials. Too high flame port temperature, on luminous burners, will cause stoppage from carbon deposition due to gas "cracking"; high copper content alloys, in heat jones, will be attacked by hydrogen sulphide in the gas. It is advisable that automatic kitchen heating appliances undergo a periodic inspection at least once a year.

The Ventilation of Manholes By Holes In the Covers

● **Bureau of Mines Report of Investigations 3307, entitled "Ventilation of Manholes: 1. Effect of Holes in the Covers on Natural Ventilation" by G. W. Jones, W. E. Miller, John Campbell and W. P. Yant; June 1936. (Abstract by G.A.S).**

BUREAU of Mines investigations have shown that in addition to combustible gases from the usual sources other types of gas, which are termed "soil" gases, also occur in manholes and are more difficult to eliminate because they have no fixed origin and because seasonal and barometric changes affect their production and passage into the manhole space. These gases appear to be produced by bacterial reactions and fermentation or through reactions of entrapped air in the soil; they are usually abnormally high in carbon dioxide and low in oxygen, contain varying amounts of methane, and are especially dangerous to men entering manholes because they lack sufficient oxygen to support life. Owing to the difficulty of constructing gas-tight manholes, the most feasible method for eliminating soil gases from manholes is by ventilation.

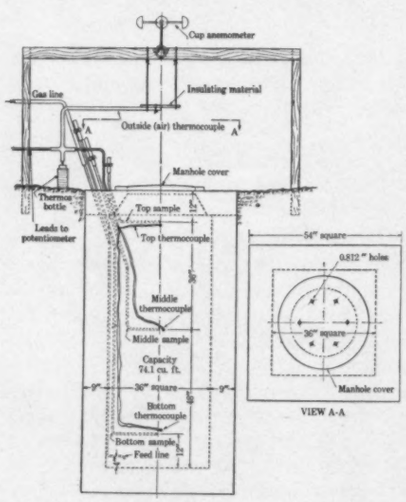


FIG. 1. Experimental manhole.

Consequently the Bureau initiated a study of natural ventilation methods for the removal of these gases from manholes and also for taking care of unforeseen accumulations of combustible gases and vapors.

The following factors were considered by the Bureau to be important to the natural ventilation of manholes: (1) Relation of area of ventilation openings to the capacity of the manhole, (2) size and shape of the manhole, (3) design of the ventilation openings, (4) wind velocity, and (5) weather conditions.

An experimental manhole was especially constructed for the purpose and situated back of the Pittsburgh Experiment Station in a ravine having rather steep hills to the north and south but open at the east and west. In many respects this location can be considered comparable to a manhole in a city street with rather tall buildings on both sides.

The manhole, as shown in Fig. 1, was 8 feet deep and 3 feet square in cross section and had a capacity of 74.1 cubic feet. It was constructed of reinforced concrete with a standard iron manhole ring in the top slab. The cover was 27.5 inches in diameter and was supplied by the manufacturer with 6 round ventilation openings that had an average diameter of 0.812 inch. Forty-eight additional openings (0.75 inch in diameter) were drilled through the cover at equally spaced points, so that the effect of larger ventilation areas could be studied.

A ¼-inch copper tube was used for feeding combustible gas into the manhole at a point near the center and 4 inches above the bottom. Three additional ⅛-inch copper tubes were installed for sampling the atmosphere at 1 foot below the cover, half way between the the bottom and top, and 1 foot above the bottom of the manhole, respectively. All sample-tube openings were on the vertical center line of the manhole. Three thermocouples were installed for measuring the temperature of the atmosphere

TABLE NO. 1. VENTILATION TESTS SHOWING VARIATION IN THE CONCENTRATION OF COMBUSTIBLE GAS IN THE TOP, MIDDLE, AND BOTTOM OF THE MANHOLE AND AIR CHANGES PER DAY, WITH CHANGE IN THE NUMBER OF VENTILATION OPENINGS. CAPACITY OF MANHOLE, 74.1 CUBIC FEET; REGULAR TYPE COVER USED.

Number of ventilation holes in cover	Area of openings, square inches	Area of openings, square inches per 100 cubic feet of manhole space[1]	Combustible gas used in test	Density of gas used, air = 1.0	Average amount of combustible gas fed into manhole per day, cubic feet	Average maximum concentration of combustible gas in manholes, per cent by volume[2]				Duration of test, days	Average wind velocity, miles per hour	Ventilation, air changes in manhole per day
						Top	Middle	Bottom	Average			
48[3]	21 66	29 25	Natural gas	0.64	14 60	0.86	1 04	1 05	0.98	7 00	2 5	20 10
42	19 01	25 65	Natural gas	.64	14.47	1.06	1.08	1 05	1 06	3.33	4.1	18 40
30	13.72	18 50	Natural gas	.64	14.50	1.42	1.45	1 40	1 42	4.00	1.5	13 77
24	11.07	14 95	Natural gas	.64	14.40	1.29	1 12	1 35	1.25	7.00	2.6	15 55
21	9 74	13 14	Natural gas	.64	14.40	1.36	1 38	1 34	1.36	5 00	1 8	14 30
18	8.41	11 35	Natural gas	.64	14 47	2.04	2 17	2 12	2 11	5.00	1.6	9 25
15	7.09	9 57	Natural gas	.64	14 35	1.90	1 88	1 97	1.92	3.33	.5	10 08
12	5.76	7.77	Natural gas	.64	14.70	3 26	3 26	3 21	3.24	6 33	1 6	6 11
10	4.88	6 60	Natural gas	.64	14.60	3 55	3 75	3 60	3.63	4 33	1 6	5 42
8	3.99	5 39	Natural gas	64	14 50	3 69	3 83	3 79	3.77	5.00	2 2	5 19
6	3 11	4.20	Hydrogen	.07	14.40	4.24	4.34	4 11	4 23	2.00	.9	4 60
6	3.11	4.20	Natural gas	.64	16 06	4.99	5 48	5 25	5.24	3.89	1.8	4 14
6	3.11	4.20	Ethane	1.05	14 40	5 29	5.78	7 20	6.07	4 33	1.9	3 20
6	3.11	4.20	Butane	2.01	14 02	4 23	4.80	10 26	6.43	4.33	2 0	2 94
4	2.07	2.80	Natural gas	.64	15.10	6.42	7.00	6 55	6.66	5 00	2 4	3 06
2	1.04	1.40	Natural gas	.64	14.70	8.45	8.62	8 04	8.37	5.00	2.0	2.37
1	.52	.70	Natural gas	.64	14 40	10.18	10.22	9 93	10.11	5.00	1.9	1.92
0	....[4]	....[4]	Natural gas	.64	14.60	31.29	31.27	30.93	31.20	3.00	2.0	.63

[1] Measured at prevailing temperatures and pressures.
[2] Analyses on a dry basis.
[3] 6 holes 0.812 inch in diameter; remaining holes 0.75 inch.
[4] Small amount of air leakage around rim of cover.

at the inlets to the gas-sampling lines. An additional thermocouple was placed 2½ feet above the manhole cover for recording outside temperatures. A cup anemometer was installed on a cross bar 5 feet above the cover for measuring wind velocities.

Tests were made to determine the effect of number of ventilation openings on the air changes that took place in the manhole per day. Each test lasted 2 to 7 days; the series of tests extended over more than a year and represented different climate conditions, manhole temperatures, wind velocities, and barometric changes.

Before each test was begun the cover was removed and the manhole purged with fresh air for several hours by means of a mechanical blower. The cover was replaced, and all cover openings, except the number chosen for test, were closed with rubber stoppers. The gas flow was started and adjusted to the desired rate, as indicated by a calibrated flow meter. The actual quantities of gas were measured by a calibrated wet meter. In the course of each test the percentage of combustible gas in the manhole atmosphere started at zero and then increased to a maximum, when the leakage from the manhole, due to ventilation, equaled the amount fed into the manhole. The time required to reach this maximum concentration varied with the amount of ventilation. For all tests except those with no openings in the cover the maximum average concentration was reached within 4 hours. Samples of the atmosphere were taken at the top, middle, and bottom of the manhole 4 and 8 hours after the initiation of the test and three times a day thereafter. Coincident with the taking of the samples, measurements and records were made of the temperature, both inside the manhole and 2½ feet above the manhole cover, the gas rate per hour, barometric pressure, average wind velocity, relative humidity, weather conditions, and rainfall.

Table No. 1, giving the results of tests made, shows that the ventilation (air changes per day) in the manhole is almost directly proportional to the number of openings in the cover. The number of openings in the cover is the factor that chiefly affected the ventilation and shows strikingly the advisability of having ventilated manhole covers.

Other reports will follow dealing with the effect of size of the manhole on the ventilation rate, and the effect of wind velocity, specially designed manhole cover openings, and ventilation ducts.

Possibilities of Fuel Oil Coking By the Gas Industry

● **D. W. WILSON, The M. W. Kellogg Co., New York, N. Y.; addressing Technical Section, Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936; topic "Economics of Oil Refining by the Gas Industry"—(Abstract by G A S).**

FOR many years the oil industry has processed residual oils, either reduced crude or a mixture of reduced crude and cracked fuel oil, in such fashion that the resulting products are coke, gas, gasoline and gas oil.

Fig. 1 shows the flow sheet of a typical modern plant. The charging stock is pumped through heat exchangers in the tower overhead vapor stream and in the stream of gas oil from the bottom of the tower. This pre-heated material then passes through the tubular furnace and from there to one of several coke drums. The material is heated sufficiently in the furnace so that with the time and temperature allowed in the drum it is reduced to coke. The usual practice is to use one drum for collecting coke for a certain period of time. This drum is then removed from this service and the furnace outlet products are switched to another drum. The coke drum which has been cut out of service is freed of its coke, then put back into use and the cycle repeated.

The vapors leaving the coke drums or stills pass to a fractionating tower from which gas oil is removed at the bottom and gasoline is taken as overhead vapor. The gas oil stream from the bottom of the tower is pumped through heat exchangers, water cooled and then pumped to storage. The overhead vapor stream of gasoline passes through a heat exchanger, water cooler and then to a separator. The cold condensed gasoline is then in part returned as reflux to the fractionating tower and in part taken to storage.

The approximate utilities required for the coking unit considered for this case are:

Water.....500 Gals. per Minute
Steam.....7,000 Lbs. per Hour

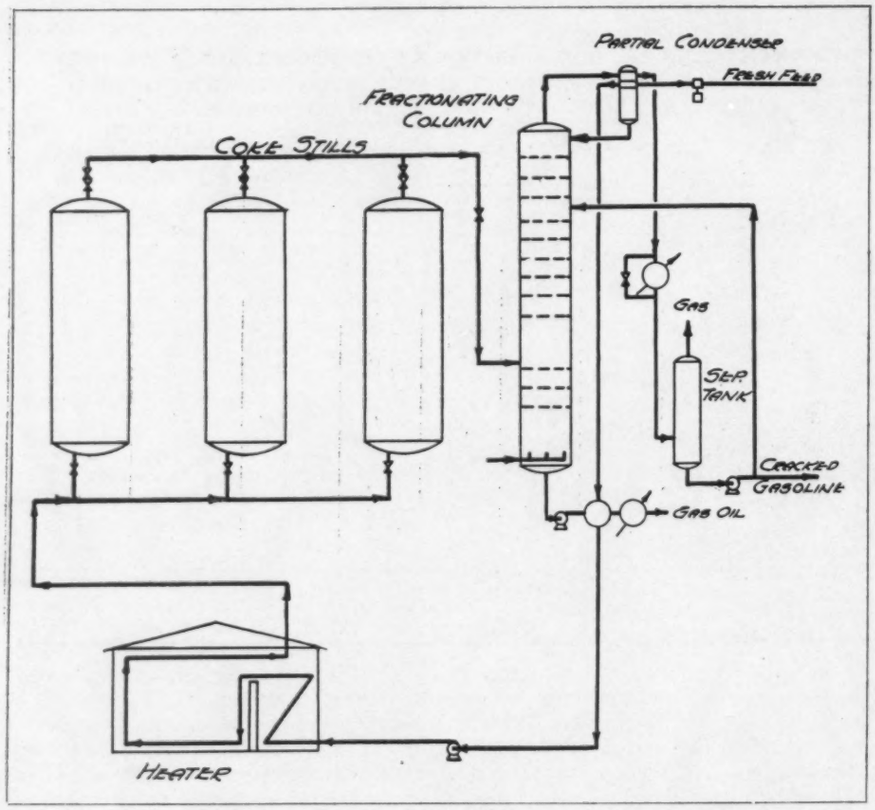


FIG. 1. Coking Unit.

Power.....1,275 Kw.hr. per Day
Fuel Oil.....35 Bbls. per Day
Operating Labor....2 operators per shift

Table No. 1 shows the approximate yields from coking on the basis of charging to the coking unit 17-18° A.P.I. gravity reduced crude, that is, virgin bottoms. Experience has shown that it is entirely practicable to coke in this manner commercial fuel oils having a gravity of 12-13°A.P.I. as long as these do not contain more than about 30 per cent of heavily cracked bottoms resulting from gas oil cracking. In other words, this coking operation can be successfully applied using as charging stock commercial and readily available fuel oils.

TABLE NO. 1

	20% Mid Continent Reduce Crude 17°-18° API
Charge	1,280 Bbls.
Gasoline	130 Bbls.
Gas Oil (28-30° API)	1,000 Bbls.
Lump Coke	13 Tons
Coke Breeze	13 Tons
Gas	280,000 Cu.ft.*

*Heating value—2,200 B.t.u./cu.ft. equivalent to 160 Bbls. of Gas Oil.

The method of removing coke from the drums has been for some time in commercial use and is the result of considerable experimentation. Steel wire cables are wound inside the drum before it is put into use. After the drum is filled with coke these cables are pulled out with a winch and by this means the coke is removed.

It will be observed that from the coking operation the only product which is not immediately usable and useful in the gas industry is gasoline. Furthermore, the amount of gasoline produced per day is relatively small, consequently it is entirely conceivable that it might prove economical to make no separation between gasoline and gas oil, thereby replacing the fractionating tower with a separating drum only. Under this condition all the products produced from coking would be consumed by the gas industry.

It is suggested that in many installations the gas industry should seriously consider the coking of commercially available fuel oils as indicated in this report.

■ ■

Panhandle Eastern Gains 260% In Detroit Gas Deliveries

With 60 per cent of Detroit meters in natural gas service, September sales of natural gas by the Panhandle Eastern Pipe Line Co. for distribution in Detroit rose to more than 353,000,000 cubic feet, representing an average daily delivery of nearly 12,000,000 cubic feet, J. D. Creveling, president, has announced. This represents a gain of approximately 260 per cent over August.

Commercial Aspects of Thermal Polymerization

(Continued from Page 21)

gas, respectively. Referring to Table No. 1, for lean natural gas, the first three columns show the characteristics, including heating value, of the original raw gas, while the final three columns show the total gas derived from processing 1,000,000 cubic feet of original raw gas through feed recovery and polymerization. A polymer liquid yield of 0.52 gallons per 1,000 cubic feet of original gas is shown in the bottom tabulation. Table No. 2 shows a similar breakdown for rich natural gas. All yield figures assume a propane recovery for polymerization feed and recycling of 90 percent, based on the original gross feed.

The raw liquid polymer produced has an A.S.T.M. endpoint temperature of 440 to 550° F., with a sharp "tail" at the higher end of the distillation curve. The 400 to 450° F. endpoint material separable from the total polymer by an ordinary degree of fractionation in the rerun operation will represent from 90 to 97 liquid volume per cent of the total polymer liquid, the ratio of gasoline to total polymer being influenced by plant operating conditions and the character of the feed stock.

The portion of the total polymer boiling in the motor fuel range is characterized by:

1. High volatility (30-50 per cent evaporated at 158° F., compared to 20-25 per cent for ordinary motor gasoline).
2. High octane number—77 to 78 C. F. R. M. for the straight polymer gasoline is normally obtained under present commercial operating conditions.
3. Ease of Treating. Polymer gasolines from this process have been found to be extremely susceptible to vapor phase clay treating.

Thermal polymer gasoline may be used directly for motor gasoline, but it is evident that its present most economic use is as a high quality blending agent in conjunction with base stocks, either straight run or cracked. Its greatest economic value is attained in the preparation of blends for premium grade gasolines, or in the case of natural gasoline manufacturers, the direct marketing of motor fuel with premium characteristics.

On a fuel basis of 10c per 1,000,000 B.t.u., the liquefied charging stock can be appraised at approximately 0.93 cents per gallon. Using this charging stock value, and taking fuel credit for the tail gas from the polymerization unit, a manufacturing cost before fixed charges of 2.21 cents per gallon of polymer gasoline is obtained.

Koppers Gas and Coke Co. Re-named Koppers Co.

THE name of Koppers Gas and Coke Co., Pittsburgh, Pa., has been changed to Koppers Co., according to a company announcement.

Three subsidiary companies have been or will be dissolved and will become divisions of the parent company. These include The Koppers Construction Co., which becomes the engineering and construction division; Koppers Products Co., which becomes the tar and chemical division, and The Bartlett Hayward Co., which becomes the Bartlett Hayward division.

The Western Gas division of The Koppers Construction Co. becomes a division of Koppers Co., as does the American Hammered Piston Ring division of The Bartlett Hayward Co. The Maryland Drydock Co., The White Tar Co. of New Jersey, Inc., and The Wool Preserving Corp. remain as subsidiaries of Koppers Co.

Officers of the former subsidiaries will become officers of Koppers Co. To avoid similarity of titles, the name of The Koppers Co., parent company of Koppers Co., will be changed to Koppers United Co.

■ ■

Portland Gas & Coke Co. Announces New Rates

OFFERING substancial savings for many customers, the Portland Gas & Coke Co., Portland, Ore., has announced a new reduced rate schedule for full automatic water heating or refrigeration or both used in conjunction with gas cooking, according to a report from Hilmar Papst, vice-president and general manager of the company.

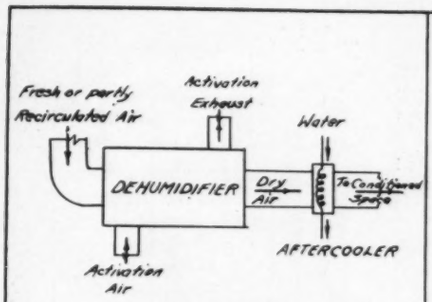
Under the new schedule the customer may have automatic hot water for less money, may have additional quantities of hot water for the same money or at a slight additional cost, and may apply the savings for the equivalent quantities of hot water on the operating cost of an Electrolux refrigerator. Calculations show that a customer having only a gas automatic water heater may use 40 per cent more gas for the same money he has been paying. This is enough additional gas to operate a gas range in an average home.

■ ■

Advertising Committee Offers Promotional Cook Book

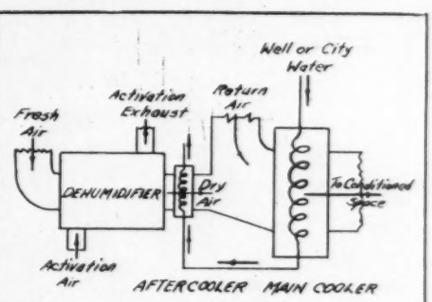
Last month the A.G.A. Committee to conduct National Advertising sent to participating companies a novel cook book, "Controlled Cooking", which is intended as a promotional piece for local advertising tie-in or as a counter give-away in connection with the current national advertising campaign. The book contains up-to-date receipts and speed menus, each of which has been tested and timed by a group of experts, including practical cooks and home economics authorities. The book features a story on the advantages of modern gas ranges and other application to the American Gas Association. Sarah Field Flint, well-known home economics authority.

Copies of the book are available upon application to the American Gas Association.



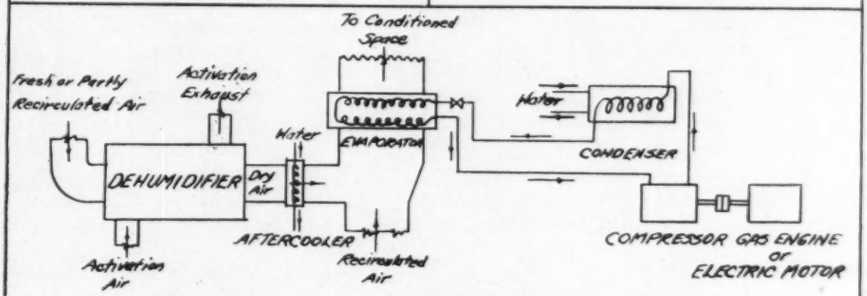
SILICA GEL SYSTEM

FIG. 1



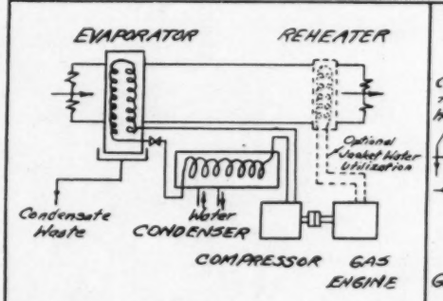
SILICA GEL WITH WATER COOLING

FIG. 2



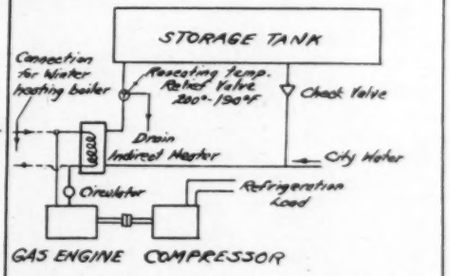
SILICA GEL WITH COMPRESSION COOLING

FIG. 3



PURE COMPRESSION WITH GAS ENGINE

FIG. 4



UTILIZATION OF HEAT FROM ENGINE JACKET

FIG. 5

Air Conditioning Systems Compared

● **L. OURUSOFF, Washington Gas Light Co., Washington, D. C.; in report to Process and Comfort Air Conditioning Committee, L. A. Bickel, Dallas Gas Co., Dallas, Texas, Chairman; presented to Industrial Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by G A S).**

IT is difficult to imagine a market for gas, wherein local conditions have a greater bearing on successful development than in gas summer air conditioning. Availability of natural or manufactured gas, electric rates, oil prices, water supply, climatic conditions, etc., each or all may be a determining factor in the selection of proper policies and of rational equipment for successful load building. There is no one type of gas summer air conditioning equipment which is adequate per se in all sections of the country.

The following outline is an attempt to illustrate briefly the economic value of different combination systems, when used under varying local conditions.

Figs. 1 to 5 represent a more recent selection of practical and typical gas operated systems, each of which have their merit depending on local conditions.

Fig. 6 is a graph of comparative gas and electric rates for equal air conditioning cost, applied to various gas systems versus conventional electric compression refrigeration. This graph does not take into account fixed charges, ventilating, city water or maintenance costs, and applies to average installations such as stores, moderately sized restaurants, drug stores, beauty parlors and residences. The object of the graph is to provide a first step in roughly estimating

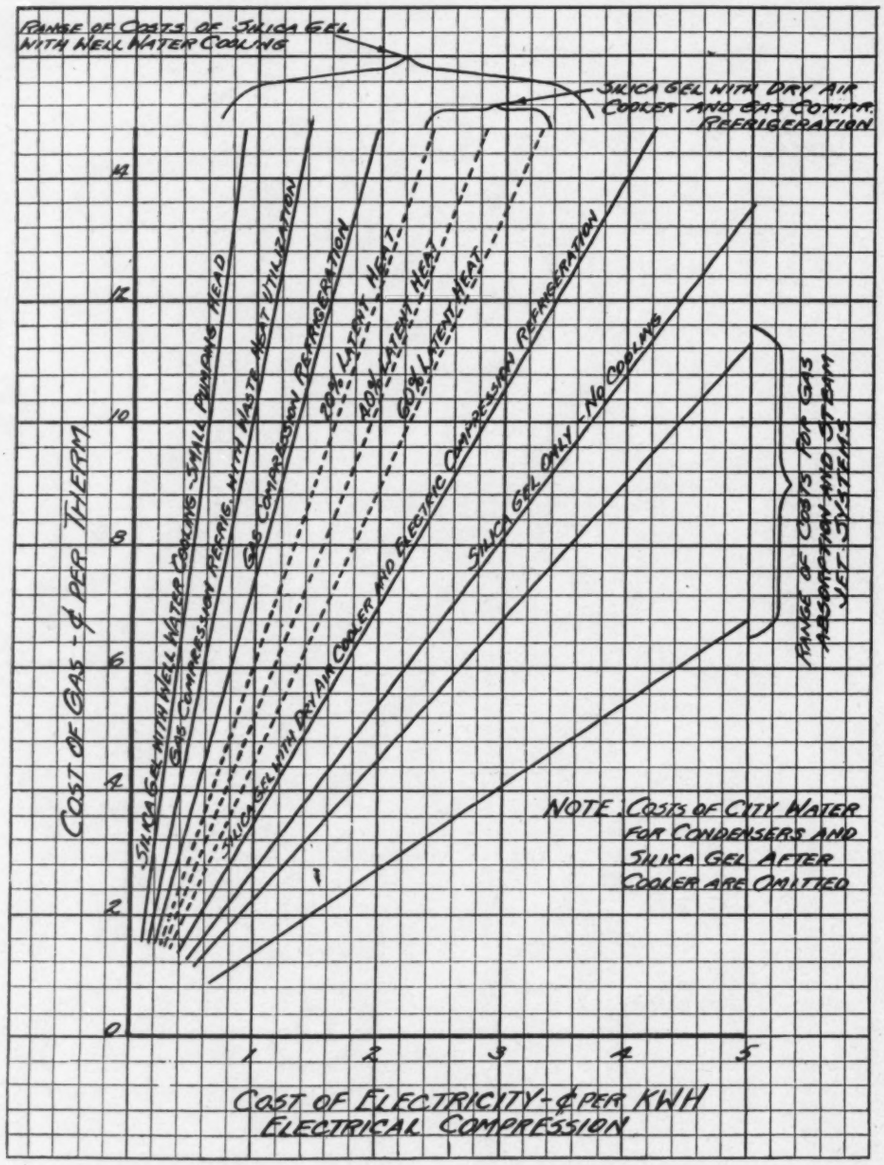

RANGE OF COSTS OF SILICA GEL WITH WELL WATER COOLING
SILICA GEL WITH DRY AIR COOLER AND GAS COMPR. REFRIGERATION
SILICA GEL WITH WELL WATER COOLING - SMALL PUMPING HEAD
GAS COMPRESSION REFRIGERATION WITH WASTE HEAT UTILIZATION
20% LATENT HEAT
40% LATENT HEAT
60% LATENT HEAT
SILICA GEL WITH DRY AIR COOLER AND ELECTRIC COMPRESSION REFRIGERATION
SILICA GEL ONLY - NO COOLING
RANGE OF COSTS FOR GAS ABSORPTION AND STEAM JET SYSTEMS
NOTE. COSTS OF CITY WATER FOR CONDENSERS AND SILICA GEL AFTER COOLER ARE OMITTED
COST OF GAS - ¢ PER THERM
0
2
4
6
8
10
12
14
1
2
3
4
5
COST OF ELECTRICITY - ¢ PER KWH
ELECTRICAL COMPRESSION

FIG. 6. Equalized fuel and power costs. Air conditioning systems using gas versus electrically driven conventional compression systems.

TABLE NO. 1

Full load efficiency of electric motor	.860
Full load efficiency of gas engine	.223
Coefficient of Performance of Freon Compressor	3.77-4.90*
Coefficient of Performance of Silica Gel without dry air cooler	.30
Coefficient of Performance of Silica Gel with dry air cooler	.39
Coefficient of Performance of Absorption or Steam jet system	.15-.25
Coefficient of Performance of Well water refrigeration	5.0-80.0
Overall Coefficient of Performance of Electric Compression	3.25
Overall Coefficient of Performance of Gas Compression	.84
Overall Coefficient of Performance of Gas Compression with waste utilization	1.17
Overall Coefficient of Performance of Silica Gel and Electric Compressor	1.92
Well water @ 50° F.—Silica Gel entering air @ 95° DB—77° WB	

* Sensible cooling at 55° evaporator temperature.

Note: By "coefficient of performance" is meant the ratio of the heat extracted by refrigeration and/or dehydration plus any heat usefully reclaimed, to the heat or equivalent energy input of the system.

possibilities of gas where electrical air conditioning is being promoted. City water consumption is relatively unimportant in this first approximation, being about equally a problem for gas and electricity. It can be generally stated that fixed charges in the case of dehumidifiers and fixed charges plus maintenance in the case of gas engines must be figured at a higher rate than for electrical equipment. Nevertheless Fig. 6 indicates such great possibilities for gas from a fuel cost standpoint, that obviously in many parts of the country this will more than compensate for the high fixed charges or maintenance costs. It should be kept in mind also that fixed charges on gasoline type engines, factory converted and fully equipped for gas fuel, to which we have reference in Figs. 1 to 6, are much lower than on the heavy, low speed type specially designed gas engines. And furthermore, these charges should decrease much further the day when automobile manufacturers further undertake this type of mass production.

The calculations for Fig. 6 are based on the assumptions as shown in Table No. 1.

Waste Heat Utilization

Of considerable interest to many localities should be the system of gas driven compression air conditioning with engine waste heat utilization, represented in Fig. 5. It will be noted from Fig. 6 that in this instance competition with electricity is greatly reduced by availability of free hot water. The hot water can be obtained at extremely suitable temperatures in the neighborhood of 200° from the engine jacket, and stored. When the engine is not running, an automatic gas booster heater can furnish the heat; in winter the heat exchanger can be connected to the main heating plant. Such an installation would be entirely practical for many restaurants, beauty shops, drug stores and the like. The heat reclaimed from the engine was figured conservatively, committing all the energy was available in the exhaust gases and claiming about 80 per cent of the jacket water heat, or approximately 35 per cent of the engine B.t.u. input.

If desired nearly 50 per cent of the engine input could be recovered from waste heat, but this would usually involve excessively costly and complicated equipment.

Another system, interesting for its low operating costs is the one shown in Fig. 2. Whenever relatively shallow wells or inexpensive city rates can provide water ot 50° to 65° the operating costs are usually much lower than with electric compression, as shown in Fig. 6.

Selling Natural Gas to Industrial And Commercial Customers

● **E. P. KRAMER, Atlanta Gas Light Company, Atlanta, Ga.; addressing Industrial Gas Section, Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by GAS).**

The sale of natural gas to industrial and commercial customers must be recognized as more than a one-man job, even though some communities may be so small as to require the employment of only one man for the direct selling of commercial and industrial gas. The successful commercial and industrial gas salesman must be willing, and have the privilege, of calling on other members in his and other organizations for assistance. In the case of gas companies of sufficient size to have a commercial and industrial sales department of several men, the ordinary run of problems can usually be cleared up by a mutual exchange of ideas. In the case of the smaller companies it is sometimes possible to handle these companies from a central organization if they be financially associated.

Sales and Engineering Data: The diversity of problems which must be met are such as to require a very complete data file. There is available a tremendous mass of sales and engineering material. It would probably be impossible to have available all the information on all commercial and industrial subjects, but it is important that an adequate central file be maintained to cover as wide a variety of subjects as may be useful.

Principles of Salesmanship: The commercial and industrial gas salesman's job is such that he must frequently sell what the customer needs rather than what the customer likes. Industrial salesmen must sell gas where gas has an operating and economic advantage in comparison with other fuels, rather than to sell a load or a piece of equipment which may later be displaced as the result of better engineering and better selling on the part of his competitor. The load thus obtained may have been an expensive one to attach and also as a result of this improper selling may close the door to future sales, not only in the prospect's business, but in his home.

Incidentally, in the sale of natural gas it is important that the proper relationship be maintained with commercial and industrial customers in order that their domestic requirements may be more readily sold, and it is equally important that their domestic requirements be properly sold in order that their commercial and industrial load may be more easily attached. This is true because of the wider market for natural gas, both domestic and industrial.

Advertising and Publicity: Selling commercial and industrial gas is largely a matter of personal contact. However, customer acceptance must be prepared in advance of a sales call in order not to miss a potential sale because the prospect is not willing to even consider the matter and also in order to help the customer have a better understanding of the proposition when it is presented in person. An excellent means for preselling is to use the national advertising sponsored by the A.G.A. Industrial Gas Section for which reprints are regularly furnished.

Publicity articles in the various trade magazines are also very effective in obtaining customer interest in gas.

Market Analysis and Rates: No set of rates can be intelligently written without first having a proper market analysis of all fuel and power using prospects in the territory. Having obtained this market analysis, together with the unit costs, a thorough engineering and economic study must be made of the various potential classes so that the proper grouping of potential loads may be set up even though one prospect may have two or more important loads which fall under different classes. The advantages of natural gas and the competitive position of other fuels varies as to different types of loads and certainly demands this study.

Having classified the various potential uses a general grouping of classifications should then be made with compromises here and there, so as to have a minimum number of different rate classifications. Experience has shown that it is useless to attempt to set up rates for natural gas which are higher than the economics of the case justify.

Developments of New Markets: New markets for gas must be constantly explored and promoted, such as floodlighting which even without profit *is a good ad,* and also the use of gas in air conditioning both for dehumidification and sensible cooling, combined with gas engine by-product waste heat for heating.

It is desirable to seek and give cooperation with the engineering schools and colleges in the respective areas. It is no reflection on the professors in these colleges to say that they probably do not realize the tremendous field in the gas business for scientific research and experimentation in modern application of gas. Neither do they have the equipment with which to teach their students these problems.

It would be of the greatest mutual benefit for gas companies which have such opportunities to discuss these problems with the professors and to encourage and assist in investigations in the modern application of gas. A proper appreciation of the importance of these problems cannot fail to have its effect, five and ten years from now, on the students who at least got some knowledge of them in college.

Controlling Costs and Operation of Business Automobiles

METROPOLITAN Life Insurance Co.'s Policyholders Service Bureau has made a study of costs which enter into operation and ownership of business automobiles which has interest for utility companies, as the following abstract indicates.

The report presents the results of a survey of a group of companies, representative of many lines of business, regarding their policies and practices in controlling the operation and costs of automobiles used in the conduct of their business.

Fifty-three companies representing many lines of business contributed their experiences for this study, including companies of various sizes operating in all sections of the country.

Ownership Policy

One of the fundamental problems in connection with automobiles used by employees is the ownership policy to be employed. The cooperating companies reported as follows regarding the ownership policies in effect:

Exclusive use of company-owned cars	12
Exclusive use of employee-owned cars	28
Use of both types of ownership	13
Total	53

In the 13 companies using both types of ownership practically all of the cars are company-owned.

The principle advantages cited by those executives favoring company-owned cars included the following:

1. Actual operating expenses are frequently less than allowances expected by employees for operating their own cars.

2. The use of the company's name on cars carries a definite advertising value. This practice is usually followed only with company-owned cars.

3. It simplifies the employment of satis-

The Reception Was Great!

GARLAND JEWEL

Gas-Fired ≠ All-Steel

AIR CONDITIONER

Aroused Intense Interest

ACCLAIMED A POWERFUL NEW AID TO NEW AND BIGGER BUSINESS!

The premier presentation of our latest, major contribution to stimulate the ever-growing popularity of America's greatest fuel —gas—was received with extreme enthusiasm by every executive of the industry, who viewed it at the Convention.

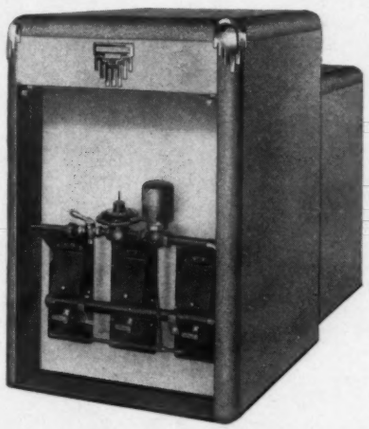
The GARLAND-JEWEL, Gas-Fired, Air Conditioner is destined to prove an immediate, dominant, influence in promoting a more rapid development of the real economic and superior merits of GAS for Home Heating.

The recent initial presentation to the public of Detroit of the GARLAND-JEWEL Air Conditioner aroused instant, spectacular acceptance. Its superlative engineering soundness, its remarkable performance and its definite beauty make for an irresistible appeal to the home builder and indicate a vast acceleration to sales volumes wherever and whenever encouraged.

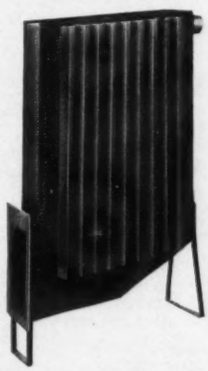
A Product of ... **DETROIT-MICHIGAN STOVE CO.**

GARLAND-JEWEL
Gas-Fired
AIR-CONDITIONER

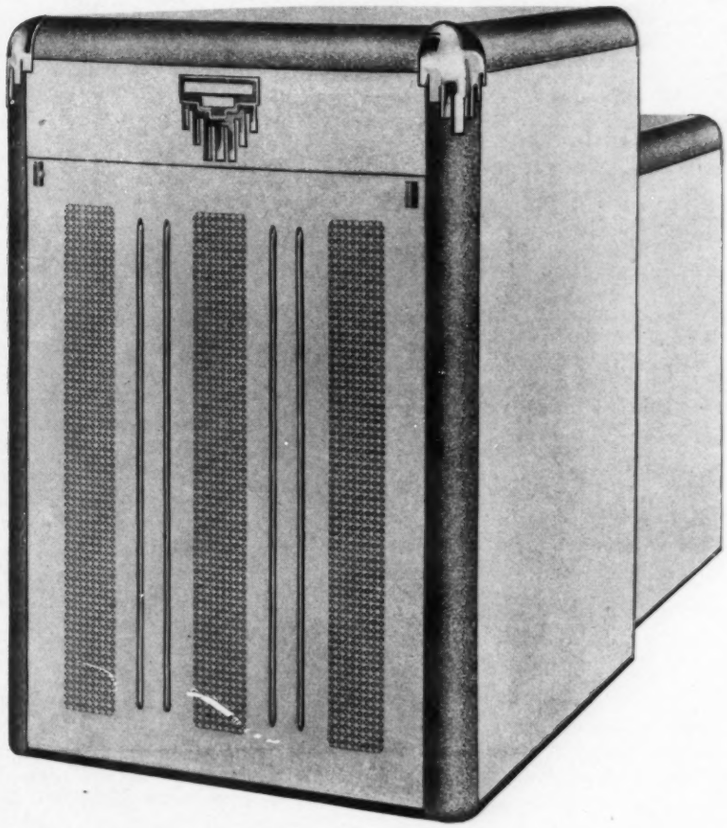
..Opens Up New Markets and Greater Profits for You



The GARLAND-JEWEL All-steel Gas-fired Furnace may be used for either gravity or blower operation. When used in air-conditioning work with the GARLAND-JEWEL Air Conditioner, the heated air is filtered, humidified, and circulated to all parts of the house. In summer, when the gas is turned off, cool, filtered air is sent through the register by the blower.
Humidity is controlled automatically, as needed. All parts are designed for long life and dependable service. Motor and blower are mounted on rubber bases, eliminating noise and vibration. The controls which regulate the gas burners, blower operation, and humidifier are durable and accurate, assuring complete automatic service at all times.



The heating units are constructed of two sections of heavy, special steel, formed under tremendous prssure, then seam welded in a one-piece, gas-tight section. Design of interior section and baffle arrangement extends the travel of the products of combustion to the point where practically all heat is transferred to heating chamber. Scientifically designed V shape fins, on outside of combustion chamber, permit maximum absorption by the air to be heated within the casing. This structural make-up makes for the utmost in efficiency and economy.



Identified by extreme beauty in design and constructed of the finest materials obtainable, by skilled workmen who have been making fine cooking and heating appliances for the home for many years, the GARLAND-JEWEL All-steel Gas-fired Furnace represents unequaled value in automatic heating devices.

The GARLAND-JEWEL All-steel Gas-fired Furnace is built in sections to meet demands of heating service, from the smallest cottage to the largest home or building. The casing is of two-tone crackled green finish, trimmed in chrome, thus adding beauty to high-grade performance.
The burners and pilots are made easy of access through removable panels in the front. When necessary, the entire front of the casing may be taken off.

DETROIT-MICHIGAN STOVE CO.

Detroit, Mich.

TABLE No. 1. OPERATING COST OF APPROXIMATELY 300 LOW-PRICED COUPES, 1934

Location of District Office	Mileage	Gasoline	Lubrication	Storage	Repairs Mech.	Repairs Body	Misc. Washing, Etc.	Tire and Tube Expense	License Insur. Deprec.	Cost Per Mile
Boston	151,821	.0015	.0019	.0067	.0026	.0010	.0022	.0011	.0134	.0404
New York	282,996	.0120	.0026	.0089	.0040	.0013	.0046	.0010	.0137	.0481
Buffalo	122,635	.0122	.0027	.0053	.0033	.0016	.0026	.0007	.0107	.0391
Pittsburgh	199,975	.0124	.0020	.0050	.0034	.0006	.0018	.0017	.0108	.0377
Atlanta	425,447	.0142	.0031	.0031	.0023	.0008	.0020	.0024	.0094	.0373
Philadelphia	173,873	.0112	.0028	.0049	.0023	.0006	.0024	.0012	.0114	.0368
Memphis	194,433	.0126	.0028	.0003	.0042	.0010	.0020	.0023	.0110	.0362
Richmond	272,705	.0134	.0028	.0017	.0020	.0006	.0016	.0019	.0105	.0345
Detroit	222,082	.0122	.0026	.0042	.0038	.0004	.0023	.0010	.0111	.0376
Cleveland	134,629	.0136	.0020	.0040	.0022	.0000	.0023	.0015	.0115	.0371
Cincinnati	330,102	.0133	.0027	.0039	.0029	.0006	.0030	.0023	.0113	.0400
Chicago	473,946	.0120	.0029	.0045	.0045	.0010	.0020	.0014	.0112	.0395
St. Louis	158,428	.0111	.0028	.0053	.0036	.0006	.0037	.0016	.0108	.0395
Minneapolis	196,161	.0134	.0033	.0039	.0041	.0005	.0026	.0018	.0090	.0386
Omaha	204,101	.0119	.0032	.0038	.0010	.0012	.0023	.0017	.0138	.0389
Kansas City	121,752	.0113	.0027	.0040	.0016	.0003	.0019	.0023	.0102	.0343
Oklahoma City	141,667	.0110	.0030	.0031	.0029	.0012	.0018	.0026	.0112	.0368
Dallas	171,917	.0118	.0036	.0029	.0024	.0005	.0017	.0019	.0086	.0334
Denver	37,152	.0125	.0023	.0042	.0010	.0004	.0020	.0018	.0092	.0334
El Paso	74,742	.0136	.0025	.0025	.0022	.0008	.0013	.0028	.0102	.0359
Seattle	99,803	.0149	.0030	.0042	.0049	.0012	.0030	.0018	.0121	.0451
San Francisco	64,677	.0128	.0021	.0054	.0028	.0001	.0042	.0010	.0156	.0440
Los Angeles	165,452	.0130	.0027	.0042	.0024	.0005	.0016	.0011	.0150	.0405
Salt Lake City	44,974	.0157	.0028	.0074	.0014	.0003	.0020	.0011	.0196	.0503
Portland	37,140	.0147	.0021	.0044	.0008	.0005	.0012	.0005	.0155	.0397
Total U. S.	4,502,610	.0126	.0027	.0042	.0030	.0008	.0024	.0017	.0114	.0388

factory representatives, if their transportation is supplied.

4. More direct supervision of automobile insurance matters is possible and the enforcement of satisfactory standards of protection is facilitated.

5. A more uniform appearance of automobiles is more readily obtained.

6. The type of car best adapted to the requirements of the business can be selected.

7. Employees are relieved of the necessary financial invstment.

8. The company can control the movements of its men better when it owns the cars.

9. Uniform standards of maintenance that can be enforced under company ownership contribute to a better accident record.

Those companies favoring employee-owned cars advanced the following reasons in support of their policy:

1. The cost of record keeping is eliminated or minimized.

2. Employee-owned cars are more logical if the mileage driven on company business is limited.

3. The necessity for provisions or adjustments for the use of the car by the employee for personal business or pleasure is obviated.

4. Employees will take better care of their own cars.

5. Employees are better satisfied with cars of their own selection than with those furnished by the company.

6. Employee ownership relieves the company of a more or less substantial investment in automobiles.

Financing the Purchase of New Cars

Where a policy of employee ownership is in effect there are times when certain employees may be financially unable to provide for replacements as they become necessary. Several companies have undertaken to provide a method of financing the purchase of new cars, either by advancing the purchase price of new cars and taking a chattel mortgage on it for security, or by setting up a reserve out of the employee's car allowance, in order to create a fund that will be sufficient to replace the vehicle when it wears out.

Automobile Operating Allowances

One of the most troublesome problems in connection with cars used for company business is the determination of an equitable basis of allowances for reimbursing employees for car operating costs. An analysis of the survey material discloses three principal methods in use. These are (a) repayment by the company of the expenses actually incurred, (b) the use of a flat allowance at a fixed rate per mile or per period of time and (c) the use of a sliding scale allowance which varies in amount with different distances traveled, different territories or different types of roads.

As a rule, employees using company-owned cars are reimbursed for the expense actually incurred, and those using their personal cars are repaid on a flat rate or sliding scale basis.

Twenty-two concerns reported their exact flat-rate allowance per mile. The median or typical allowance granted was 5.0 cents per mile, and the average was 4.9 cents.

Actual Operating Costs

The total actual operating costs per mile of company-owned cars varied considerably with the locality and the price range of the vehicles. Table No. 1 gives geographically classified data for 300 low-priced coupes operated by a large national distributor of food products.

Depreciation and Trade-In Policy

The basis for depreciation varies rather widely with different companies. The lowest expected mileage reported for this purpose was 30,000 and the highest 60,000. The majority of companies, however, expect to trade in their cars when they have run between 40,000 and 50,000 miles.

The range of depreciation among those concerns reporting exact data was from .55 cents to 1.25 cents per mile. In a majority of cases, a depreciation of 8 to 9 mills was taken, the median figure being 8.6 mills.

Personal Use of Company Automobiles

Apparently, most concerns permit employees a reasonable amount of use of company-owned cars for personal service. Of 14 companies commenting on their policies in this connection, 10 permit the personal use of company-owned cars, and four forbid such use. Two companies require employees to reimburse them for the costs incurred in personal driving.

■ ■

Second Change Made in Name of Byllesby Corp.

SUPERSEDING an announcement of change in name voted on September 16, the board of directors of Byllesby Engineering and Management Corp. has announced the filing and recording in accordance with the laws of the State of Delaware of an amendment to its certificate of incorporation providing for a change of name to Public Utility Engineering and Service Corp. to become effective immediately.

The name previously announced was Public Utility Service Corp., but it was afterwards discovered that this name was not available.

The purpose of the change in name from Byllesby Engineering and Management Corp. to Public Utility Engineering and Service Corp., according to B. W. Lynch, president of the corporation, is to more clearly indicate existence of the latter corporation as a separate and distinct organization from H. M. Byllesby and Co., the investment banking house.

Lone Star Asks Rehearing In Gas Rate Case

CHARGING that the right of judicial review of its gate rate case has been denied, Lone Star Gas Co. October 23 filed a motion for a rehearing on application for a writ of error which was denied October 7 by the State Supreme Court. In denying the application. the Supreme Court sustained the Court of Civil Appeals in a decision which is in conflict with United States Supreme Court rulings in recent months, the company avers.

The company argues that the Court of Civil Appeals decision limits the trial court in its independent judicial power by holding that the trial court should not have rendered judgment for the company if any conflict in evidence was found and if the commission produced any substantial testimony in support of its rate reduction order.

The U. S. Supreme Court has held that where confiscation is charged against a regulatory body's rate order, the reviewing court must be entitled to pass its independent judgment on the facts as well as on the law.

The company's interstate commerce business also was defended in the motion.

■ ■

Grand Rapids Co. Makes 2400 House Heating Installations

IN the 60-day period elapsed since Grand Rapids Gas Light Co., Grand Rapids, Mich., organized its gas house heating department, 2400 house heating installations have been made as of the first of November, according to Russell Harris, manager of the department. The department consists of a sales crew of 35 men, trained by two-weeks' course in house heating fundamentals.

About 90 per cent of the installations are conversion jobs, and the company contemplates starting a strictly gas-designed equipment campaign in the near future. Practically all designs of burners have been used. In many instances natural gas circulating heaters have been adopted.

Assisting Mr. Harris are Mark Hilborn and Theodore Pekelder, supervisors.

■ ■

Texas Companies Set Up Five Meter Repair Shops

Five central domestic meter repair shops have been set up by Community Natural Gas Co. and Texas Cities Gas Co. in connection with their new plan to have a meter depot to serve each division of the two companies, L. B. Denning, Jr., general superintendent, has announced. The meter repair depots have been established at Abilene, where Jack Bye is foreman in charge; Wichita Falls, M. L. Jackson; Sherman, Joe Victor; Handley, A. P. Black, and Temple, W. O'Neal Burch. Texas Cities shops at Waco, El Paso and Galveston will continue to take care of domestic meters in those cities.

■ ■

Dallas Gas Opens Branch

Dallas Gas Co. opened a branch office in Oak Cliff on Oct. 26. in the Medical Dental Building. Sue Gibbons and Thelma Walker have been assigned to the new office. Appliances will be on display.

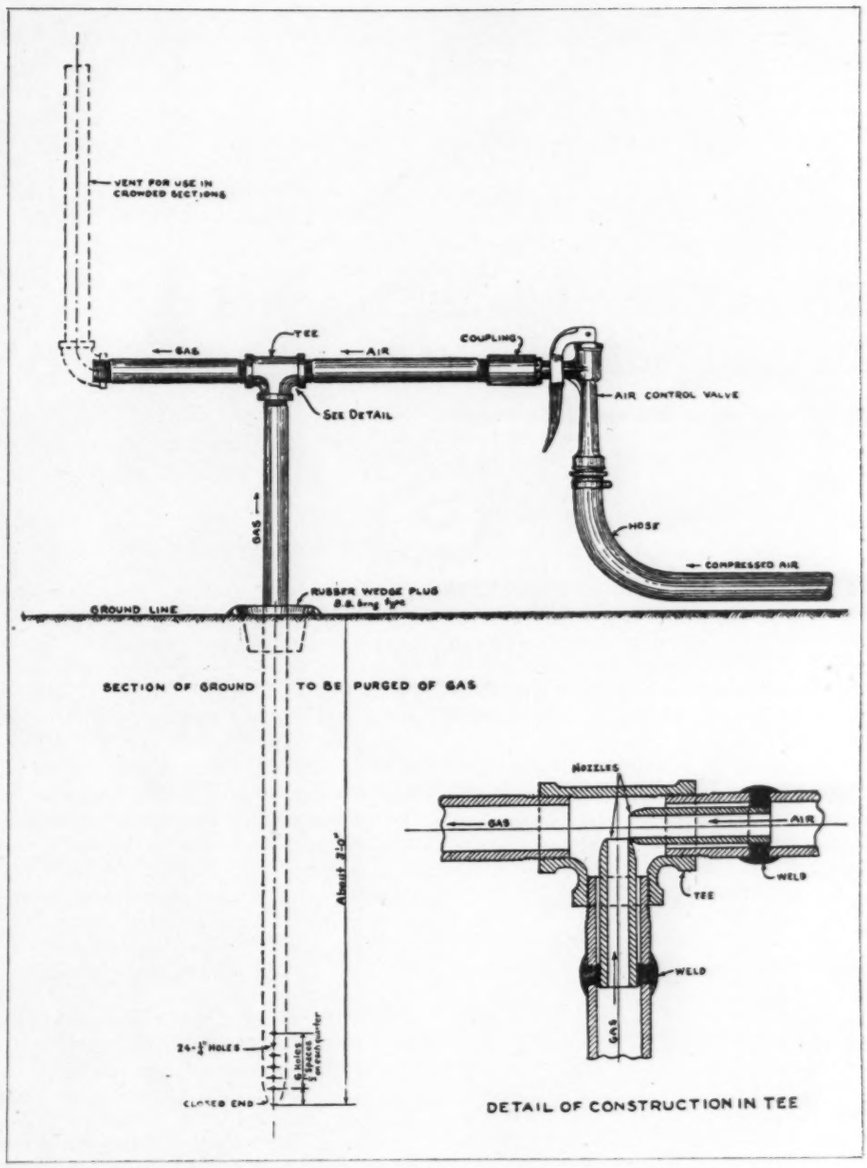


FIG. 1

The Use of An Air Pressure Ejector In Removing Gas from Soil

● **G. E. HITZ, Central Hudson Gas & Elect. Corp., Poughkeepsie, N. Y.: addressing Technical Section, Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936; title "Experience in Leak Proofing Bell and Spigot Joints"—(Abstract by G A S).**

IN the course of leakage testing, following internal treatment of leaking bell and spigot joints with a liquid sealing medium, it was found that a high residual concentration persisted in the soil ten days after treatment, necessitating development of a method of clearing the ground of this residual gas before the effect of the internal treatment could be correctly observed.

On the previous occasion a study had been made to determine the volume of gas which could be contained in a cubic foot of average soil. The particular soil studied, a sandy loam, carried one-third of its volume in gas.

Experimenting was commenced with a home-made ejector operated by air pressure. This was a very simple device as will be seen by reference to Fig 1. In the original tests of the device two bar holes 12 feet apart were driven on a paved street. Peppermint was poured into one bar hole and the ejector, or aerator as it is now called, was placed in the other. Within a few minutes the peppermint odor was discerned at the

discharge of the aerator by several people who did not know what odorant had been placed in the test hole. It was proved that in the average soil, an area of at least 100 square feet per hole can be purged of gas by this method, making it an invaluable tool in leak work.

This aerator was applied to sections covering a distance of about 800 feet. An immediate improvement in concentration was shown after completion of the work, and nine days later, when tests were again made, the sections were practically free of any concentration worth mentioning. The aeration was then continued over the entire run and a considerable volume of residual gas was drawn from the ground.

Trend Toward Small Thermal Units In the Measurement of Gas

• **DONALD A. HENRY, Stone and Webster Service Corp., New York, N. Y.; in report to Rate Structure Committee, Alfred I. Phillips, 122 Greenwich St., New York, N. Y., Chairman; presented to Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by G A S).**

BOTH in the United States and Great Britain it has been suggested that the gas industry should adopt a small thermal unit of measurement on the theory that such a unit would be more easily understood by the average customer.

The term as a unit of gas measurement was first defined in 1920 by an act of the British Parliament. By 1928, it had been adopted by 481 English, 27 Scottish and 18 Irish companies. In the United States, the first thermal unit was adopted in Chicago in 1930 as a forerunner to the introduction of high heating value mixed natural and manufactured gas.

As of January 1, 1936, 61 gas companies in 16 states of the United States were using therm rates either in complete schedules or for certain classes of business. Up to date, apparently no Canadian company has adopted the therm as a unit of measurement.

Although the therm, a comparatively large unit of measurement—equivalent in heat to about 30 kilowatt-hours of energy—is quite adaptable for commercial and industrial heat applications where heat is used in large quantities, when it is extended to the domestic gas service, it becomes open to several objections. These difficulties have led to suggestions and discussions of a smaller unit.

As early as 1923, a unit smaller than the therm was proposed but at this early stage most of the discussion concerned the desirability of a smaller unit for the measurement of heat demand. Within the past six or seven years proposals for several sizes of smaller thermal units have been advanced. These include units of 10,000, 5,000, 4,000, 3,412, 1,000 and even as small as 100 B.t.u. Each of these except the 5,000, 1,000 and 100 has been adopted by certain companies and the arguments generally have dealt with the desirability and suitability of the particular unit suggested for the measurement of *domestic* gas service.

The unit of 10,000 B.t.u. has been adopted by at least one large company in the United States as an optional unit of measurement, the cubic foot rates being continued in use. This unit has the advantage of being exactly 1/10 of a therm but otherwise it seems to have little particular appeal. It cannot be compared directly and simply with the kilowatt-hour and, although the cost of one of these "units" of heat is only 2.1 cents, a kilowatt-hour for cooking purposes in the same area sells for two cents or less which results in a poor comparison.

A unit of 5,000 B.t.u.'s, has been advocated in the United States as a means of making automatic though somewhat arbitrary allowance for the difference in efficiency of certain gas and electric applications.

It is also claimed that this unit would give easy conversion from cubic feet where the heating value standard is either 500 or 1,000 B.t.u. per cubic foot. A study shows that approximately ½ per cent of communities having gas service in the United States have a heating value standard of 500 B.t.u. for manufactured or mixed gas—the others range between 390 and 800 B.t.u. Approximately 10 per cent have a nominally stated heating value for natural gas of 1,000 B.t.u. per cubic foot—others range from 850 to 1,300.

Most of the discussion of a smaller unit seems to have centered around 3,412 vs. 4,000 B.t.u.'s. Suggestions have been made of units slightly different than 3,412—as 3,415, etc.—but to all practical purposes these can be assumed to have been proposed as a more or less exact equivalent of the Kilowatt-hour.

The 4,000 B.t.u. unit has been recommended by a committee of the National Gas Council and Institution of Gas engineers in Great Britain, which committee also recommended that if a small unit be adopted it be identical for all companies, and in addition to the therm.

However, the British gas companies have not followed unanimously the recommendation of the committee as, while several have adopted the 4,000 B.t.u. unit, others have adopted the unit of 3,412 B.t.u. Advocates of the 4,000 B.t.u. unit urge that its "bonus" of 17 per cent over the equivalent heat contained in the kilowatt-hour should be of great sales value. Its selection also, was influenced considerably by a consideration of "gross" and "net" heating values, it being felt that the 17 per cent "bonus" compensated very largely for the difference between net heating values of gas and electric units without introducing the controversial point of appliance efficiency. The fact that it is exactly 1/25 of a therm also weighed strongly with the committee.

The unit of 3,412 B.t.u. has been urged both in England and the United States as being the exact equivalent in heat content of the kilowatt-hour and, therefore, as facilitating direct and simple comparison of the cost of heat units furnished by gas and electricity. Its opponents object to it on the ground that it fails to take into account differences in efficiency of utilization and that because of possible calculations involved in conversion from cubic feet the odd numbers would create difficulty in billing.

At least one company and possibly more in England have adopted this unit. It has been the universal standard by law in New South Wales, containing most of the larger cities of Australia, since 1932, and persons in charge of its administration state that no difficulties were experienced in its introduction and great satisfaction has resulted—especially from the sales angle.

It is stated that in Australia no trouble is experienced with conversion. Meters are still read in cubic feet and meter readers are furnished with conversion tables approved by the Government. The quantity of gas used is shown on bills as so many "Gas Units." Electrical usage is measured in kilowatt-hours—called "Electrical Units."

The 3,412 unit has been adopted by three companies in the United States (all, however, belonging to one holding company group). It is called by these companies, "K. W. H. Equivalent." After one year's experience with its use, the persons responsible are enthusiastic in their view of results. No company in the United States has yet adopted either a 4,000 or 5,000 B.t.u. unit.

Along with the numerous proposals for the adoption of smaller units have come many suggestions for names to be applied to these units. In the proposed adoption of a new unit, the gas industry has an unique opportunity to adopt a distinctive name and one with sales appeal.

GREATLY INCREASED COOKING CAPACITY

PLUS GREATLY REDUCED GAS CONSUMPTION

•

NOW POSSIBLE WITH

UNIFORM HEAT TOP

WITH TOP HEAT CONTROL

•

AN ADVANCED EXCLUSIVE MAGIC CHEF FEATURE

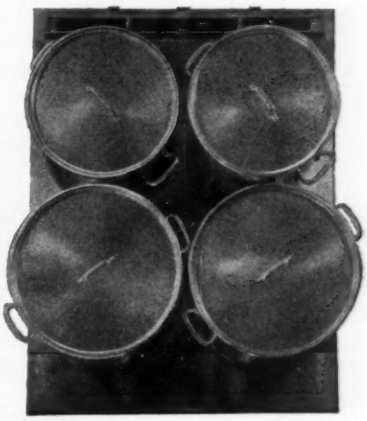
(Left) Magic Chef Heavy Duty Installation with Uniform Heat Tops at Fred Harvey Restaurants, Union Terminal, Cleveland, O.

● Greatly increased cooking capacity with less gas consumption, less equipment and less floor space are now available to the busy chef through the new Magic Chef Uniform Heat Top with Top Heat Control.

The Uniform Heat Top, specially designed as a fast top cooking area, provides accurate, uniform heat over every inch of the entire top cooking surface of the Magic Chef Heavy Duty gas range.

The Top Heat Control is simple, positive and accurate. Top burners light automatically when gas is turned on, then the graduated dial can be turned instantly to the desired degree of heat.

With their speed, economy, cooking capacity and flexibility, Magic Chef Heavy Duty ranges completely meet today's food service requirements. Write for details.



The contents of four large kettles can be cooked at the same time on one 32-inch unit at fast, medium or slow heat or at varied temperatures on each cooking plate, if desired. Four center fire ranges would be required to do the same amount of fast cooking in the same time.

The heat is positive and satisfactory because it is even *all over* the entire cooking surface while on center, front and side fire tops the heat is graduated unevenly from high to low temperatures.

AMERICAN STOVE COMPANY
BOSTON • NEW YORK • ATLANTA • CLEVELAND • CHICAGO
ST. LOUIS • PHILADELPHIA • SAN FRANCISCO • LOS ANGELES

Magic Chef
AMERICAN STOVE COMPANY

LOOK FOR THE RED WHEEL WHEN YOU BUY A MAGIC CHEF

MAGIC CHEF HEAVY DUTY *Automatic Equipment* **FOR MODERN GAS COOKING**

Is the Cost of Securing the Small Commercial Load Justified?

• **RAY TROWBRIDGE, Seattle Gas Co., Seattle, Wash.; in appendix to General Commercial Committee Report, H. A. Sutton, Public Service Electric & Gas Co., Newark, N. J., Chairman; presented to Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by GAS).**

THE answer to the above question, if there is such, will depend largely on the type of gas served, the size of the utility serving the territory, and the rates available for the small load consumer.

This discussion deals with the gas business in a moderately large city and its surrounding territory, with a population of over 402,000 persons.

The following data apply to the consumers served:

Class	*Consumers*	*Ave. M Cu.Ft./Yr.*	*Ave. Rate*
Industrial	341	305,841	71.7
Commercial	4,502	122,332	90.6
Commercial Htg.	258	136,869	62.9
Domestic	36,995	20,205	129.6
House Heating	1,145	162,108	61.9
TOTAL	42,241		

With the above as a background typical smaller load consumers are analyzed as follows:

Cleaners and Dyers: In this city there are approximately 285 cleaning and dyeing establishments, of which 65 per cent are gas users.

During the depression, the gas company was threatened with the loss of a number of these consumers to oil.

The company established new and effective rates for the small commercial user. These rates somewhat reduced its revenue but enabled it to check this oil competition. In addition to low commercial rates, another method used was the sale of automatic water heaters for preheating the water for the steam boiler and incidentally supplying hot water service for lavatory use. The rate for this hot water service reduced the operating costs in some cases but in others so increased the consumption that the total gross revenue remained approximately the same.

Many of these consumers who changed to oil have since changed back to gas.

An analysis of 33 cleaners and dyers gave the following: Average loss on placing 33 cleaners and dyers on the automatic water heater rate $4.85 per month per consumer or a yearly total of $1,920.60. However, had the company lost these jobs, its loss in revenue would have been $5,920.20 in total. Once this load had slipped away, it would have been difficult to regain it. The retaining of these small commercial consumers, adding of new and regaining of those temporarily lost to oil was certainly worthy of any expense involved.

Poultry Singeing: Small torches are not only used in singeing poultry to render them better in appearance for the market but can be used for taking the fuzz off of rattan, heating small pieces of iron for bending and for many other uses.

The method employed in securing this business in one instance was to approach a well established poultry dealer in the wholesale district and place a torch on trial. This resulted in a ready sale. Another dealer in a retail district was approached with a trial offer. Three or four altogether were seen and sold. Result—a number of these torches, both of the hand type and those connected solidly in the gas line, were called for by the poultry trade who had seen them in operation in the locations originally sold; a comparatively small sales expense yet added load worthy of the expense.

Hair Dryers: Dealers in this equipment have the cooperation of the company's shops on gas burner adjustment and service. Through dealer contact in aiding his salesmen in their contacts it has been possible to secure a number of new loads for gas and the replacement of electric service for this work. The company has not only secured the smaller loads but also some of the larger dryer loads together with automatic heating and commercial heating. The gas salesmen survey and develop automatic water heating loads in beauty (as well as barber) shops and through these contacts are able to interest the prospect in gas hair dryers and space heating.

Automatic water heating is one of the most satisfactory both to ourselves and to our customer. This is shown by the sale of 14 automatic waters heaters during 1935 with a probable revenue of approximately $500.00 from beauty shops alone.

The direct solicitation of these jobs, which are almost unnumerable, by one man or group of men who would do nothing else, would hardly earn a living and the load secured would not be entirely justified by a direct expenditure on this work alone. However, in conjunction with other work the total load gained is substantial and well worth while.

It is felt by this company that any load which pays $1.00 or more a month is a profitable one and a large number of such accounts at the highest block in the rate schedule should be welcome.

The commercial and industrial sales engineer should constantly study the 20,000 applications where gas is now used and add to these from his own resourcefulness.

A partial list of small appliances and estimated load for each is as follows:

	M cu.ft./Month	
	Min.	*Max.*
Counter Deep Fat Fryers	5	10
Automatic Toasters	3	5
Counter Griddles	5	10
Coffee Brewers	3	12
Combination: small counter oven	4	8
Combination: small griddle	3	5
Combination: small steam table	2	4
Egg Boilers	1	3
Laboratory Bunsen Burners	1	2
Water Stills	5	15
Meker Burners	1	2
Dental Torches	1	2
Brazing Torches	1	3
Cutting Torches	8	12
Soldering Irons	2	3
Curling and Marcel Irons	3	8
Instrument and Towel Sterilizers	2	5
Ice Cream Sterilizers	3	10
Branding Irons	1	3
Glue Pots	2	5
Singers	1	2
Cigar Lighters	5	6
Gas Wall Lights	1	2
Gas Sad Iron Heaters	3	10
Gas Tailor Hand Irons	3	10
Plastic Moulding Presses	3	15
China Kilns (Studio)	2	8
Photo and Film Drying Cabinets	5	15
Store and Office Heaters	1	15

■ ■

Natural Gas Being Piped to Eunice, Louisiana

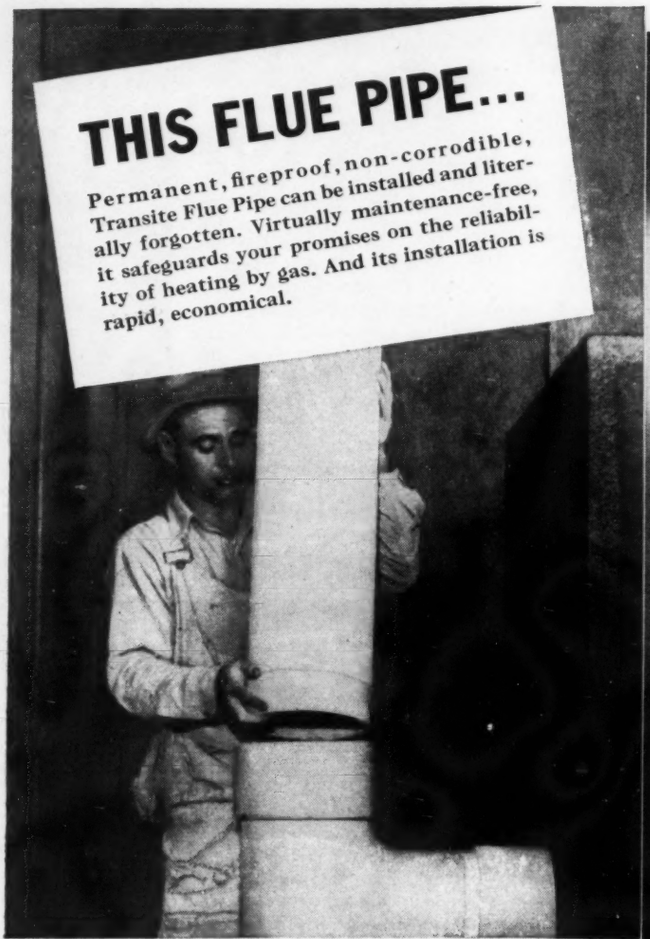
Construction of a 11-mile pipe line to bring natural gas to Eunice, La., from the Tepetate field of the Continental Oil Co. is now under way, according to a report from J. B. Lewis, mayor of the city. Gas service within the city will be furnished by the Municipal Utilities Incorporated within the next two months. Cost of installation of the system will be between $60,000 and $80,000, depending upon whether the gas is delivered to the city limits or the entire plant and pipe lines are taken over by the Municipal Utilities Incorporated.

■ ■

F. W. Stearns, Legal Advisor To San Diego Co., Dies

FREDERICK W. STEARNS, for many years a vice-president and member of the board of directors and since 1913 a legal advisor for the San Diego Consolidated Gas & Electric Co., passed away October 1. He was senior member of the law firm, Stearns, Luce, Forward & Swing.

Mr. Stearns was a member of the original legal department of H. M. Byllesby and Co., taking an active part in the founding of the company in 1910.



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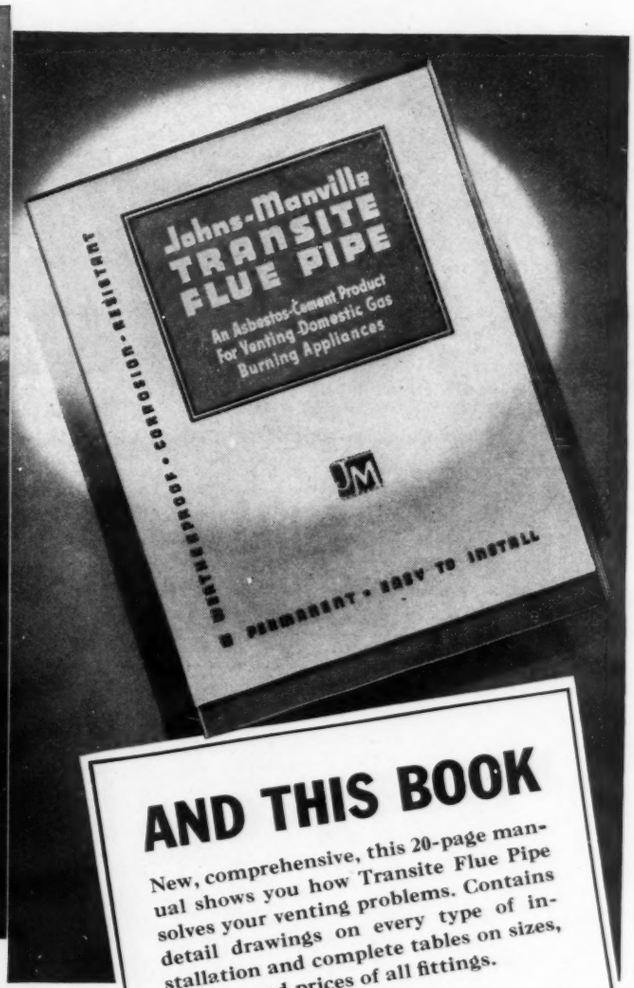
Permanent, fireproof, non-corrodible, Transite Flue Pipe can be installed and literally forgotten. Virtually maintenance-free, it safeguards your promises on the reliability of heating by gas. And its installation is rapid, economical.



AND THIS BOOK

New, comprehensive, this 20-page manual shows you how Transite Flue Pipe solves your venting problems. Contains detail drawings on every type of installation and complete tables on sizes, weights and prices of all fittings.

SOLVE YOUR VENTING PROBLEMS!

NOW—for the first time—the whole story on the one flue pipe that solves all your venting problems.

This 20-page manual tells how Transite, because of its composition, enables you to offer your customers the positive protection of a flue pipe or chimney lining that is permanently corrosion-resistant, weatherproof and firesafe. In short, a material that can be depended upon for trouble-free service through the years.

And its 30 detail drawings show how simple assembly features, plus a full line of fittings, assure quick, foolproof and economical installation on Transite Flue Pipe.

Send for this book today. Your time in reading it will be well spent. Mail coupon to Johns-Manville, 22 E. 40th St., New York City.

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G-11-36

Recent Conclusions on the Application of Pipe Protective Materials

● **SCOTT EWING, American Gas Association Research Associate, National Bureau of Standards, Washington, D. C.; in annual report to Technical Section, Eighteenth Annual Convention, American Gas Association, Atlantic City, N. J., October 26-30, 1936.—(Abstract by G A S).**

THE more important conclusions, which are also based upon a study of the American Petroleum Institute's results on operating lines are: (1) The lower economic limit of bituminous coating thickness is about 1/10 inch. The upper limit is variable depending upon the cost and nature of the coating material, the corrosiveness of the soil, and other factors. (2) The choice between asphalt and coal tar base materials depends upon relative costs. Both materials have advantages and faults and good coatings can be made from either material. (3) Whenever possible, hand methods of application in the field should be avoided. (4) Any organic reinforcement in the coating is a possible weakness. (5) External armoring enhances the value of most coatings by protecting them during the backfill and subsequent settling period. (6) It is a difficult but not an impossible thing to protect a pipe line in poorly drained soils, and it is in these soils where severe corrosion is most likely to occur.

There is considerable confusion and difference of opinion as to the best method for treating pipe at the mill, if the pipe is to be shipped to its destination before it is coated. Some coating manufacturers insist that their particular primer must be used in order to obtain satisfactory results with their coating. The spraying oil which is often applied at the pipe mill, and which is difficult to remove, is claimed to greatly weaken the bond when used with some coatings. In most cases it is not possible to ship the bare pipe because there is no suitable provision for removing the rust at the place where the pipe will be coated. The pipe manufacturers would obviously prefer to have a single primer which is sufficiently weather-resistant to protect the pipe in the yard for several months, which could be used with all types of bituminous coatings.

A test procedure was developed consisting of two essential parts: (1) mechanical and thermal tests of primed and coated panels, and (2) weathering tests of primed panels. The mechanical and thermal tests included:

(1) exposure to low temperature to determine cracking tendency; (2) examination of bond between coating and panel at 32° F.; (3) exposure in an oven at 140° F. for 5 hours to determine flowing and slipping tendencies; and (4) an impact test in which the effect of dropping a steel ball from a height of 8 feet onto the primed and coated panels is determined.

Weathering tests are important because a shop primer should prevent rusting of the pipe from the time it is applied at the mill until the pipe reaches the trench, yard, or other mill where it will be reprimed and coated with hot bitumen. Manufacturers do not claim that their primers are highly weather-resistant, but other things being equal, a durable shop primer would certainly be preferable. The rust which forms on the primed pipe, if not removed, will surely contain moisture and this moisture will cause bubbles and pinholes to form in the hot coating.

The following conclusions seem to be established from the mechanical and thermal tests:

1. The behavior of a panel in these tests is determined largely by the hot coating and to a less extent by the primer. Asphalts behave much better than either asphalt enamels or coal tar enamels.

2. Asphalt primers are not suitable for coal tar enamels and coal tar primers are not suitable for asphalts or asphalt enamels.

3. There is one case where a particular enamel seems to require a particular primer. Except for this case, any asphalt primer seems to be suitable for any asphalt or asphalt enamel, and any coal tar primer seems to be suitable for any coal tar enamel.

4. Pre-treatments of the steel did not greatly improve the performance of a primer and hot coating in these tests.

The results of the weathering tests indicate that the so-called spraying oil and asphalt primers are much less durable than coal tar base primers. Nearly all the inhibitive pre-treatments delay the time when rust appears on the panel, although some are much more effective than others. Some of these pre-treatments also materially reduce the checking and cracking of the asphalt primers.

■ ■

El Paso Co. Builds Line

El Paso Natural Gas Co., El Paso, Texas, is completing construction work on an 83-mile 8⅝-inch transmission line to carry natural gas to Ajo, Ariz., according to W. R. Denson, manager of the Ajo Improvement Co. Line pressure will be 400 pounds.

Arthur Hewitt, Consumers Gas Co. President, Dies

ARTHUR HEWITT, president and general manager of the Consumers Gas Co. of Toronto, director and past president of the American Gas Association, died September 17 at the age of 68. Born in Wolverhampton, England, Mr. Hewitt came to Toronto in 1881, being employed by the Consumers Gas Co. in 1887, which at that time served only 9,004 customers as compared to 170,000 of today.

ARTHUR HEWITT

Mr. Hewitt, who was first employed by the company as secretary to the general manager, subsequently served in the accounting department, later being appointed to the position of assistant to the general manager, whom he succeeded in 1909. In November, 1934, he was appointed president of the company. In 1932-33 he served as president of the American Gas Association.

■ ■

Peoples Gas Light Raises Rates to Meet Sales Tax

THE Peoples Gas Light and Coke Co., Chicago, Ill., raised its gas rate schedule October 24, increasing the average Chicago household gas bill by 16 per cent, according to a recent announcement by George A. Ranney, chairman of the company. The new schedule which is intended to meet sales tax costs, was made possible when Circuit Judge Stanley H. Klarkowski signed a temporary injunction restraining the Illinois commerce commission from interfering with the rate change.

Minimum bills under the new schedule will be increased from 60 to 90 cents, and the price per therm for the first two therms used each month will be raised from 58 to 90 cents. The increase will add approximately $3,000,000 a year to the company's gross revenue. Funds derived from the increase will be impounded pending the completion of a rate case now being heard.

■ ■

Oklahoma Fields Developed To Meet Gas Demand

Arrangements have been made by the Cimarron Utilities Co., Borger, Texas, to deliver gas from the extensive Texas County, Okla., fields into the main pipe line of the Panhandle Eastern Pipe Line Co. for delivery to Detroit and other points throughout the mid-west, according to an announcement by C. R. Stahl, general manager of the Borger company. The extension of natural gas markets spurred the development.

■ ■

Canadian Gas Production Up

Natural gas production for all Canadian fields during the first seven months of 1936 totalled 17,019,169,000 cubic feet as against 15,354,671,000 cubic feet for the same period of 1935.

WOMEN WANT *the complete cooking freedom of the Automatic Clock!*

WHEN YOU FAIL TO SHOW THE AUTOMATIC CLOCK YOU FAIL TO SERVE CUSTOMERS COMPLETELY

AND what woman *doesn't* want a feature that enables her to put a roast in the oven hours before dinner...set the controls that turn the gas both on and off... go out for a carefree day...and come back to a dinner that's cooked to full-flavored perfection! *That's* what women call *cooking*...and that's what a modern gas range must do to be really *complete*!

When you show your customers the new Wedgewood with the Grayson Cooking Clock... when you explain just how this magic mechanical clock makes cooking a joyous adventure, you take advantage of a *natural selling point*... you take advantage of a feature *women want*!

Model shown:
No. 1045 C-T... Closed Top, Table Top Model
No. 1085 O-T... same as 1045 but with open top

WEDGEWOOD'S AUTOMATIC FEATURES THAT MEAN MORE SALES:

- Automatic top burners that light at the turn of a hand...no matches ...no bother.
- Automatic oven lighting... no stopping to light burner.
- Automatic oven temperature control...maintains low, even, s-l-o-w heat... without attention. Cooks roasts to tender, juicy goodness... no meat shrinkage...no watching. Saves up to 20 per cent of gas.
- Automatic safety lighter on Built-in Gas Circulating Heater... instant, healthful kitchen warmth at the click of a valve. Full porcelain enameled heating unit. (Patent applied for.)

WEDGEWOOD *The Modern Gas Range*

MORE THAN A MILLION SATISFIED USERS

JAMES GRAHAM MANUFACTURING COMPANY · San Francisco · Los Angeles · Newark · Portland

Prize winning float of Coast Counties Gas Co. entered in the Santa Cruz, Calif. 167th birthday celebration.

Coast Counties Co. Contrasts Kitchens

THE Coast Counties Gas and Electric Co. took advantage of the recent 167th birthday party celebration in Santa Cruz, Calif., to call to the public's attention the contrasts between old and new kitchens, through the float (shown above) which was entered in the parade.

One half of this float was given over to an old fashioned kitchen, where Miss Margaret Floyd as the lady of long ago, had a busy time keeping wood in the stove, testing her baking, taking out ashes, and getting the water hot for the baby's bath, all at the same time. Little Shirley Bamber, as the baby in the tub, was periodically the subject of an old fashioned scrubbing.

Contrasted with this was the rear portion of the float, featuring a modern gas range, a mechanical refrigerator, and all the other advantages of a thoroughly modern and up-to-date kitchen. Miss Evelyn Kelly, the modern housewife, pulled beautifully browned biscuits from the oven, just at the right moment, due to the heat control on her range, or leisurely peeled potatoes, while little Donna Bamber played on the floor and both enjoyed radio broadcasts on latest kitchen hints.

Favorable comment was heard throughout the community concerning this float, which took second prize in its division, and it is believed much good will result from the vivid portrayal of these kitchen contrasts brought to the attention of local residents in this way.

■ ■

SERIES 10 CIRCUIT

Exclusive with Minneapolis-Honeywell

ONLY Minneapolis-Honeywell can offer the control performance made possible by the exclusive Series 10 Circuit. That is one important reason why it pays to standardize on this superior line of controls. In addition your service department can operate more efficiently and will have fewer calls, and your stock room will have to handle only one line to fill all control requirements. Minneapolis-Honeywell Regulator Co., 401 East 28th Street, Minneapolis, Minn.

MINNEAPOLIS HONEYWELL

Control Systems

Bristol Co. Names Four Men As Service Engineers

THE Bristol Co. announces the appointment of four graduate engineers to service engineer posts in the company's field service organization. These men, E. H. Hart, J. N. Swarr, K. J. Platt, and R. A. Barnes, have just completed a two-month training course at the factory at Waterbury, Conn., under the supervision of F. A. Faust, sales research engineer, and G. T. Evans, general staff engineer.

While these newly appointed men will be available for installing, checking, and adjusting Bristol Instruments, their primary function will be to take care of the company's many customers who have subscribed to the periodic inspection service.

Mr. Hart, assigned to the Boston office, is a graduate of Geneva College, Beaver Falls, Pa., where he received a B. S. degree. Mr. Swarr, assigned to the New York office, replaces G. T. Evans who has been promoted to the engineering department at Waterbury. He is a graduate of Purdue University where he received a B. S. degree in Electrical Engineering. Mr. Platt, assigned to the Philadelphia office, received a B. S. and an M. S. degree in chemical engineering from Queens University, Kingston, Ontario. Mr. Barnes, assigned to the St. Louis office, is a graduate mechanical engineer from Purdue University.

■ ■

P. G. and E. Builds Adobe Houses For Kettleman Crew

FOUR adobe houses of five rooms each are in process of construction by the Pacific Gas and Electric Co., San Francisco, at the Kettleman Hills Compressor Station, near Bakersfield, for housing families of employees at the station.

The houses, each with garage, are being constructed of sun dried adobe bricks formed from soil on the property. They will follow the lines established by early California architecture, and have walls eighteen inches thick, and tile roofs. All interiors will be thoroughly modern. It is estimated that four months will be required in the making of bricks and building.

■ ■

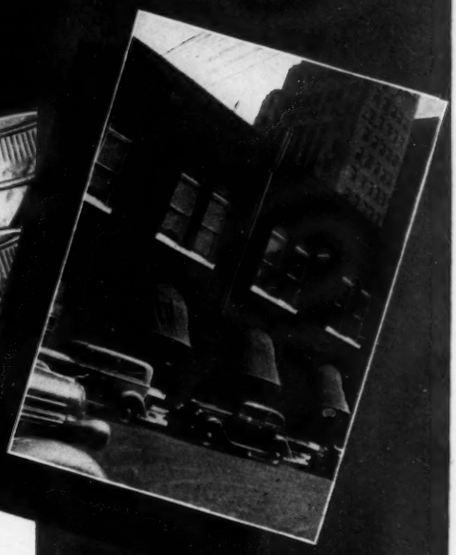
Cleaning Transmission Lines with a Scraper

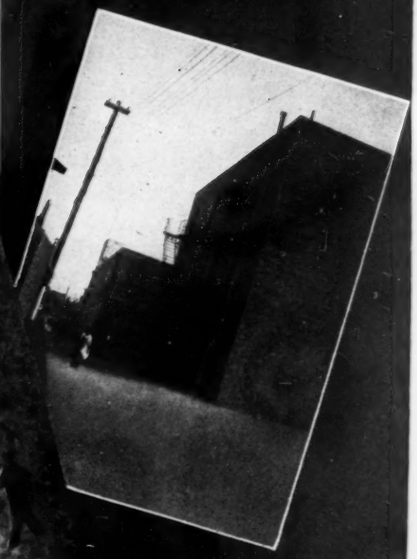
(Continued from Page 15)

stream from the drip, indicating that this drip was quite efficient in removing the foreign substances from the gas stream. The coat was crystalline in nature and a purplish brown color. It was dry and adhered firmly to the interior of the pipe so that it could be scraped off with a knife blade only with difficulty, and although probably not more than 1/16-inch in thickness, was very rough and undoubtedly caused a great deal of turbulence in the gas stream. In cleaning this section, large quantities of dust and debris were carried out of the pipe in the gas stream ahead of the scraper. The scraper was rerun through one portion of line containing this character of coating in order to determine whether two cleanings were advisable but it was decided that a second cleaning was unnecessary. The scraper blades, which up to this time had been of hardened tool steel with square edges, were found to be worn off by this hard scale in such a way that the front edge was appreciably rounded and the top surface beveled so that the only point of contact with the pipe was at the extreme rear edge of the blade. Accordingly, the front edges of the blades were coated with stellite and the blades were ground to a bevel to give clearance at the rear edge. This modification of the blades proved to be quite effective in removing the hard scale. The scraper became stuck on only one occasion, where the pipe was offset within a constructive sleeve, but allowed sufficient passage of gas to maintain service until removed.

Such a device has great possibilities as an item of regular pipe line maintenance, and could be operated very simply and easily if the pipe line were constructed with insertion and removal stations, and with provision for easy removal of the smaller quantities of deposits that would be loosened if its use were fairly frequent.

PAYNE "A" GAS VENT





NON-CORROSIVE . . . INSULATING

★ The popularity of Payne "A" Gas Vent is increasing. Tests and installations have proved its adaptability for venting gas appliances under almost any climatic or structural condition. Products of combustion from natural or manufactured gas have no deteriorating effect on the 99% pure aluminum inner tube of Payne "A" Vent.

For exposed or concealed installation, the efficiency of Payne "A" Vent has been definitely established. The illustrations show two difficult venting problems where Payne "A" Vent was used to replace an unsatisfactory material, absolutely eliminating difficulties with condensate.

The high quality of materials used in its manufacture, the complete insulation, its strength, non-breakable construction and ease of installation have made Payne "A" Gas Vent the most desirable gas vent on the market. It's without an equal in the field.

Ask for descriptive circular

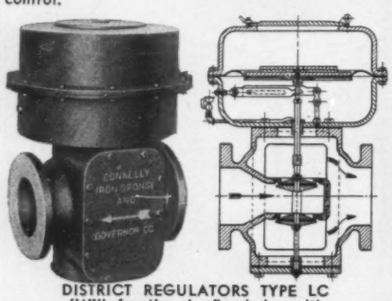
PAYNE FURNACE & SUPPLY COMPANY
BEVERLY HILLS, · CALIFORNIA

Connelly Products
Which You Saw at Atlantic City Are Backed by 60 Years' Service to the Gas Industry.

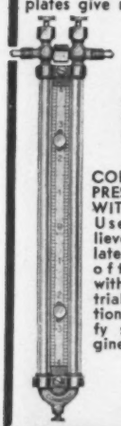
DIRECT READING BTU INDICATOR
No lag in reading. May be used on any kind of gas. Especially valuable on Mixed Gas. Furnished with and without electric signal system and remote indicating dial. Simple, accurate convenient.

SERVICE REGULATORS CONNELLY TYPE GV.
Pounds to inches . . Less moving parts than other makes . . Efficient control . . . Fully Accessible . . Double guided, renewable stream - lined, soft - seated valve gives increased capacity and perfect regulation.

The Connelly Jr. is made in ¼" size only —Compact, simple and sensitive for small capacities.
Connelly Type DCS and DCW—Spring or weight loaded; occupy small space and give accurate control.



DISTRICT REGULATORS TYPE LC
(Will function in flooded vault)
ADJUSTABLE TRAVEL: Balanced Valves with hard or soft seats; Renewable Valve Ports.
FLEXIBILITY: Connelly District Regulators have adjustable linkage between the diaphragm and valve stem which provide unusual power for valve movement.
ACCESSIBILITY: The large side plates and bottom plates give maximum access to inspect or repair.



U-GAUGES
(Unbreakable)
Universal U-Gauges using glass substitute tubing threaded into metal fittings.

CONNELLY BACK PRESSURE VALVE WITH AUTO VENT
Used to relieve accumulated pressure often met with in industrial installations to satisfy safety engineers.

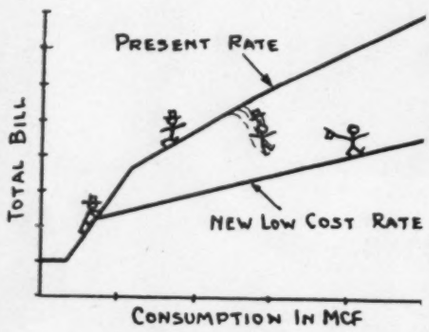
WRITE FOR BULLETINS.

Connelly
Iron Sponge & Governor Co.
Chicago, Ill. Elizabeth, N.J.

Cartoon Booklet Carries Objective Rate Plan to Wisconsin Consumers

IN introducing a new Low Cost Objective Rate plan, to residential customers of Burlington, Wis., Wisconsin Southern Gas Co. issued a booklet that not only described clearly and simply "What the Rate Is,—How It Works,—and How You Can Use It," but also resorted to the use of simple cartoons to send the message home to the customer.

The 20-page booklet opened with "Why We Have an Objective Rate Plan." "In order to exist," says the text, "any business enterprise must earn money and enough money to enable it to keep operating and to pay a reasonable return to its owners."



Cartoon picturing customers jumping to a low-cost rate level as their volume of gas consumption increases.

The fact that gas rates depend largely on the volume of sales is illustrated by a balloon carrying the volume of gas upward. "As the gas company sells more gas to individual consumers," says the text, "the cost to the gas company does not increase in proportion to the increase of sales to each customer. Therefore rates are designed so that the average cost of gas becomes lower as more gas is sold."

In further emphasizing the volume of gas as controlling costs the consumer is referred to the cost of coal. "If we buy one ton of coal, we pay perhaps $10.00 per ton, but if we buy a carload, we pay $5.00 to $7.00 per ton."

Going directly to the point of the Low Cost Objective Rate, the plan is described as a method to increase the volume of sales and permit the customer to buy more gas at a very small additional cost.

The customer is pictured in a cartoon as jumping off the present rate schedule to a new low-cost rate, as his total consumption increases.

"Suppose you used 2,000 cubic feet of gas in January, 1935," suggests the text, "and in 1937 you increase your consumption to 3,000 cubic feet, through using your range more liberally or because another appliance was installed. Under the present rate the bill for 2,000 cubic feet would be $3.60. Under the low-cost rate plan the 1,000 cubic feet of gas over and above your basic use of 2,000 cubic feet would cost you only 75 cents making your bill for January, 1937, $4.35. If we figure your bill on the objective rate, the total would be $4.20."

The cross-over rate or bargain rate is described as the rate by which the user goes over from the present rate to the objective rate. "For all gas used in excess of the 'basic use' gas customers shall be billed for such gas at a rate of 75 cents per 1,000 cubic feet until bills figured at the objective rate are reached."

The last pages of the booklet describe the special offer being made in connection with the installations of automatic storage type hot water heaters. "If you use gas exclusively for water heating you will automatically be billed for all of gas used at the low cost objective rate." The additional cost of gas in connection with other appliances is also explained by the booklet.

■ ■

Iowa City Co. Granted Right To Serve Natural Gas

IOWA City Light and Power Co., serving manufactured gas to Iowa City, Ia., was granted permission to install natural gas in the city under a ruling advanced last month by Judge Charles A. Dewey of the federal disrtict court in Des Moines. In granting this concession to the power company, Judge Dewey also set aside an ordinance passed by the Iowa City council lowering the rate on manufactured gas as confiscatory. The rulings upheld the findings of Allen A. Herrick, master in chancery, which found that the introduction of natural gas would bring a saving to fuel consumers in the community and that a rate reduction on manufactured gas would prove confiscatory to the utility.

The Iowa City Light and Power Co., which is a subsidiary of the United Light & Power Co. of Chicago, hopes to complete the change-over within a few weeks according to Roscoe E. Taylor, general manager of the company.

■ ■

R. H. Sonneborn Appointed To Republic Steel Sales Post

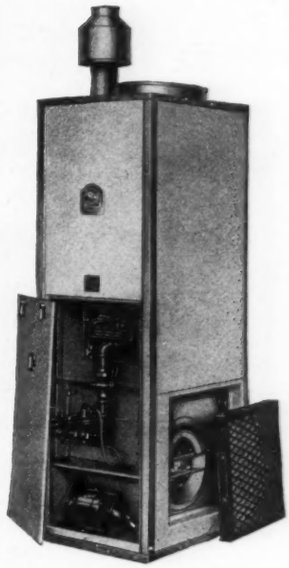
R. H. SONNEBORN has been named assistant manager of sales, pipe division, of Republic Steel Corp., Cleveland, according to an announcement by N. J. Clarke, vice-president in charge of sales. Mr. Sonneborn was formerly special representative and assumes the position vacated by the appointment late last year of George E. Clifford to the position of district sales manager at Los Angeles, and more recently by Charles W. East, district manager of the Houston district. Martin I. Shea will continue as the other assistant manager in the pipe division, which position he has held for the past 8 years.

Mr. Sonneborn studied Mining Engineering at the Colorado School of Mines, later studying Mechanical Engineering at the University of Michigan.

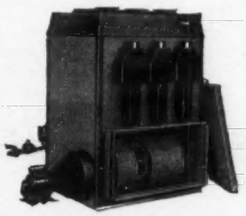
DOUBLE PROTECTION

1. Protects YOU by providing the correct appliance for every job . . . NO LOST SALES!

2. Protects your customers by insuring efficient, economical dependable performance . . . NO COME-BACKS!



Pacific Forced-Air Unit Furnace



Complete Cooperation

Pacific offers gas companies and appliance dealers full cooperation in modern load-building programs . . . in every territory and climate. We furnish types of equipment for modern gas heating, ventilating and air conditioning problems. Write for latest catalog WG-11.

Pacific Gas Radiator Co.

HUNTINGTON PARK, CALIFORNIA, U. S. A.

Oldest and Largest Manufacturers of Gas Heating Appliances in the West

PGR

THOUSANDS OF GAS MEN

MADE SUCH FAVORABLE COMMENT ON THE

HOTZONE

line of

GAS WATER HEATERS

at the recent A.G.A. Convention at Atlantic City, that we again ask your consideration of them to help make your forthcoming water heater campaign a success.

Hotzone

BASE THEIR REASON FOR SELLING SO MANY HOTZONE WATER HEATERS ON THESE FACTS:

a—Quality Appeal

b—Customer Acceptance

c—Efficiency

d—Minimum Service

e—Low Operating Cost

"Welsbach Company has been Pioneers in the manufacture of Gas Burning Appliances since 1887."

WELSBACH COMPANY

Factory—Gloucester City, N. J.—Branches in Chicago and San Francisco

SCIENCE AND ENGINEERING SKILL CREATED

GLO-FIRE

APPROVED ODORLESS GAS LOGS

A circulating heater. The solution to your fireplace load problem . . .

ODORLESS
NATURAL
ECONOMICAL
A. G. A. APPROVED

A truly modern gas heating appliance, equipped with slotted venturi type burner. Approved also as an unvented appliance.

WRITE TODAY FOR DETAILS
EXCLUSIVE DISTRIBUTORS

COLONIAL SHOPS
Glo-Fire Sales Division
3350 W. FIRST ST. LOS ANGELES

In Los Angeles
it's the
HOTEL
CLARK
Fifth and Hill

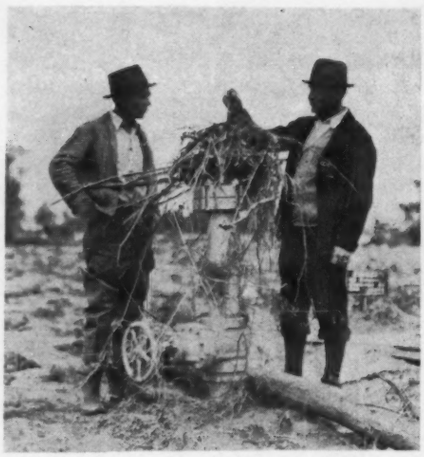
555
Rooms-Baths

from $2.50 PER DAY

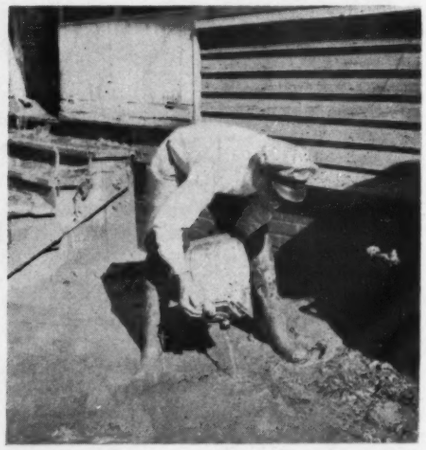
Famous for Good Food from Coast to Coast

RIGHT downtown in the center of things. Easy chairs, sleep-inspiring beds, large rooms with luxurious fittings.

P. G. B. MORRISS
Manager



C. H. Lucas and Waco foreman Eldon Glenn inspect the main line blow-off covered with debris.



J. N. Bates, service man, removing water from a flooded meter after the water subsided.

Flood Fails to Halt Lone Star Service

FLOOD waters from the Brazos River, which wiped out the Lone Star Gas Co.'s 16-inch main line suspension bridge a few miles east of Waco, Texas, September 28, failed to interrupt the company's service to the towns and communities served by the line, when Waco pipe line employees succeeded in routing the gas through an auxiliary line after the devastating waters had wrecked the bridge.

By October 5 a 6-inch temporary line was laid across the river, and plans are now under way for another bridge to replace the fallen structure.

First warning of flood waters reached Eldon Glenn, foreman of the Waco district, on the morning of September 27th, and he assembled and instructed his crew to turn the gas into the emergency line if the bridge was threatened. Working day and night and braving hazardous conditions, Glenn and his crew attempted to push the mounting debris from the tottering bridge. Two men of the crew, John Brown and J. G. Martin, made an effort to reach the gate valve on the south side of the river by row boat, but it was submerged by the rising waters before they could reach it. As the bridge fell and the line broke, Glenn and members of his crew stationed on the north side of the river shut off the gate valve, and gas was turned into the auxiliary line.

Shown above at left are C. H. Lucas and Waco district foreman Glenn standing by the main line blow-off. Glenn holds a stick to show the distance the water rose over the blow-off. In the lower right-hand corner of the picture is seen the gate valve box. Shown at right is J. N. Bates, one of more than a dozen service men who struggled through mud and water for more than 60 hours to cut off gas service connections that had been broken by the raging waters of the Brazos River.

Lone Star Affiliate Brings Gas to Vickery, Texas

EXTENSION of main lines of the County Gas Co., member of the Lone Star System, to the town of Vickery, Texas, three miles north of Dallas, was completed late in September when consumption was started from the company's distribution system. Work on the project was begun August 15.

Gas is supplied from the Chickasha, Oklahoma, field; the West Texas area, Texas Panhandle; Fox field in Southeastern Oklahoma, and from the Cayuga and Long Lake fields in Anderson County, Texas. One hundred and fifty possible meters are to be served in the town which has a population of several hundred. Distribution operation is handled by the Dallas office of the County Gas Co.

A 2-mile, 6-inch and 8-inch main line, tapping the company's system in the northern outskirts of Dallas, and seven miles of distribution mains and customer services were laid under the direction of D. D. Taylor, superintendent of distribution of the street department. J. B. Davidson was foreman in charge of laying the town's distribution system.

Rates are on the same basis in force for other communities served by the County Gas Co., which is operating at Vickery under a franchise granted by the County of Dallas.

■ ■

Mystery Chef Makes Hit In Portland Area

DURING the first month that the Portland Gas & Coke Co., Portland, Ore., sponsored the Mystery Chef radio program more than 4,000 recipes books were distributed to listeners who called in person at the Portland or other offices of the company. According to Vernon R. Churchill, Portland manager for the McCann-Erickson advertising agency, the response to the program in the Portland area has brought more requests for the cook books and comments from listeners than in any other city of similar size in which the program has been given.

Nationally the program has already distributed over 700,000 of the 1,000,000 books printed in the first order.

Southern Natural Must Pay Alabama Franchise Taxes

UNDER final judgment rendered by the Alabama Supreme Court, the Southern Natural Gas Corp. will be required to pay the State Tax Commission the $15,466.59 in state franchise taxes that has been the subject of litigation for many months. The supreme court decision reverses the action of the Montgomery Circuit Court in Equity last spring which favored the corporation.

It was held by the supreme court in reversing the decision that the corporation, although organized under the laws of Delaware, functioned under a charter and privileges granted by the Constitution and the laws of Alabama, and that it conducted its business, employed its capital in the State of Alabama for the sale of natural gas to local consumers by wholesale and retail, and that the corporation was therefore subject to franchise tax fixed and adjudged by the State Tax Commission.

Whether the corporation will accept the judgment or carry the case to the Supreme Court of the United States has not been indicated.

■ ■

P. G. and E. Issues Booklet On History, Facilities

PACIFIC Gas and Electric Co. has just issued a profusely illustrated pamphlet dealing with its history, facilities, and service. While much of the text and illustrative material deal with electricity, several pages are devoted to the company's gas service.

Illustrations include a map of the company's territory showing the gas transmission mains, a bird's eye-view of the Kettleman Hills district, whence comes the greater part of the company's natural gas supply, exterior and interior views of the gas compressor station at Kettleman, and plants in the northern part of California where manufactured gas is still being served.

The pamphlet was prepared for distribution in answer to requests for information about the company. Copies of it were distributed as souvenirs to the delegates to the World Power Conference who recently visited California on an excursion.

■ ■

U. S. Bureau of Mines Issues Mineral Yearbook

The United States Bureau of Mines last month issued its *Minerals Yearbook 1936,* a review of the mineral industry during calendar year 1935 both in the United States and abroad. The book contains government statistical information on nearly 100 metals, minerals, and mineral products, and presents a comprehensive record of economic developments and trends in the mining industry. Included in its 1136 pages are 69 chapter heads, 154 illustrations, and a complete index. Books may be obtained through the Bureau of Mines in Washington, D. C.

■ ■

Beaver City Grants Franchise

Beaver City, Nebraska, has granted the Southern Nebraska Natural Gas Co. a 25-year franchise to serve the community with natural gas, adding approximately 90 meters to the company's distribution system.

Shoots in the heat!

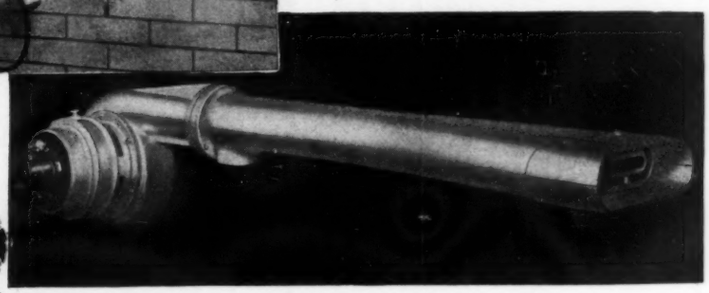
N. G. E.
BAKE OVEN
BURNER
Type G.A.

Note from the illustration how easily this burner is swung into firing position; how it may be pointed to any cold corner of the oven just like a gun; how proper heat can be "shot in" to get perfect baking results. Adjustments are simple—and a dial valve permits exact settings.

N. G. E. Type G. A. Bake Oven Burners are the development of engineers thoroughly familiar with bake oven design and operation. They are without question the ideal burner for installation in direct-fired, inside furnace or "Dutch" ovens. Outstanding success in thousands of bakeries offer substantial proof of their efficient performance. Uniform heat distribution, perfect combustion, large reserve burner capacity, economy in fuel consumption—all features of the Type G. A. design—will guarantee production economies that can be measured in actual dollars and cents.

Get your copy of the N. G. E. Bake Oven Burner Bulletin. It tells how bakers will save time, fuel, labor and space.

NATURAL
GAS EQUIPMENT, INC.
Petroleum Securities Bldg. Los Angeles
1123 Harrison St. San Francisco



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AMBASSADORS

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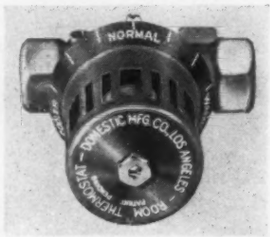
No. 40

GENERAL GAS LIGHT COMPANY
KALAMAZOO, MICHIGAN

YOUR Console Heater SALES Will PROFIT

by the Domestic Room Thermostat



The public is demanding automatic heating. And when a console heater is equipped with a Domestic Room Thermostat to deliver constant automatic heat, it becomes much more saleable merchandise.

The Domestic Room Thermostat is easily installed on the line ahead of the heater. Already many lines of console heaters come factory equipped with the Domestic Room Thermostat. It will pay you to investigate.

Domestic Manufacturing Co.

700 East Florence Ave. Los Angeles, Calif.

Legionnaires on K. P. in Model Kitchen

K. P. DUTY in France was never like this, according to Legionnaires William Fortman of Williston, Mass., and M. D. Eddy of Quincy, Mass., delegates to the 1936 American Legion Convention held recently in Cleveland, Ohio. They are shown here with Miss Catherine Dubisson of the American Gas Association Testing Laboratories Staff in Cleveland in one of the model kitchens at the Great Lakes Exposition. Messrs. Fortman and Eddy are members of the Williston, Mass., drill team, which won the Massachusetts State championship for three consecutive years and then climaxed their achievements by winning the National Championship for drill teams at the Legion Convention. The drill team has won honors in Massachusetts for three years.

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Appliance Group Conducts Range Drive

"WAKE Up Your Kitchen With a Modern Range" was the challenge of the second Annual Fall Range Campaign conducted by the Gas Appliance Society throughout northern California during the first two weeks in November, according to a report from H. M. Crawford, general sales manager of the Pacific Gas and Electric Co., San Francisco.

During the campaign $5.00 was deducted from the regular price of kitchen heater types of gas ranges. New model ranges were featured. Liberal trade-in allowances on old ranges were offered, and accounts were carried on easy terms.

Pacific Gas and Electric Co. tied in with the campaign by installing gas range expositions and window displays in 53 of its major offices. Throughout the campaign the P. G. and E. Co. and the San Joaquin Light and Power Corp carried tie-in newspaper advertising in 96 towns in the two districts.

In conjunction with the utility campaigns, the Gas Appliance Society supported the campaign with counter, window, and floor cards, space in daily and weekly newspapers, radio broadcasts ovre 17 stations, movie slides in approximately 100 local theaters, all featuring the theme of the campaign, "Wake Up Your Kitchen With a Modern Gas Range."

Although the Gas Appliance Society normally conducts only one gas range campaign a year, the success of the Spring campaign was thought to warrant the campaign just concluded. As northern California gas range sales, totaling 35,670, for the first 9 months of 1936 were 33 per cent up over the 26,814 total for same period in 1935, sponsors of the campaign are confident that the final tabulation of sales results will more than justify the campaign.

■ ■

Taylor Named Sales Manager of Pittsburgh Water Heater

J. D. Taylor was appointed sales manager of the Pittsburg Water Heater Corp., Pittsburgh, Pa., effective October 27, according to a company announcement.

For the past three years Mr. Taylor has been Southern representative for the Edgar Morris Sales Co., Washington, D. C., district of Pittsburg Water Heaters. Prior to that he was successively the sales manager of the Walker-Pratt Manufacturing Co. of Boston and the Baltimore Gas Appliance and Manufacturing Co., of Baltimore, Md.

■ ■

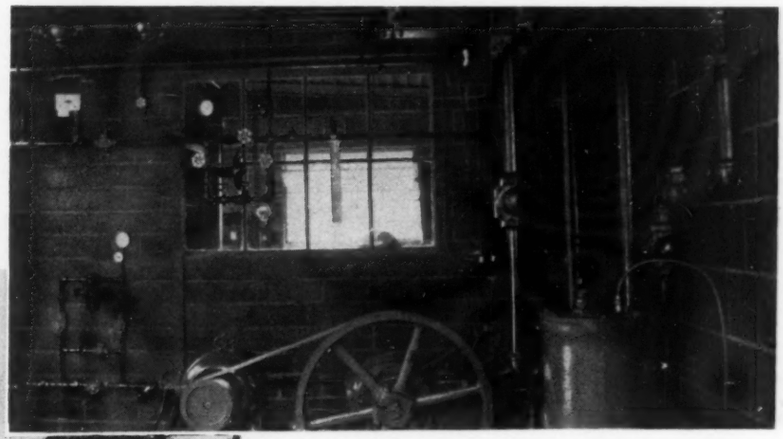
Acme Steel to Use Gas

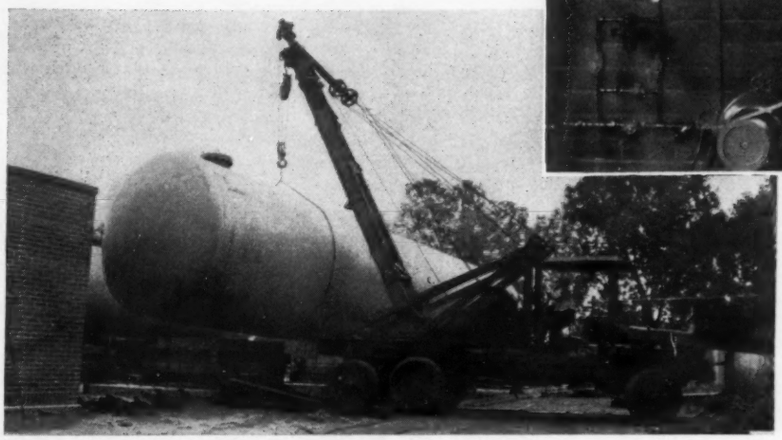
Public Service Co. of Northern Illinois, Chicago, is currently laying a 12-inch natural gas main from Calumet City through Dolton and Riverdale to the Acme Steel Co. plant in Riverdale. Cost of the line, which taps the 24-inch transmission line from Texas to Chicago, is placed at $250,000.

BUTANE-PROPANE NEWS

Butane-Air Central Plant in Service at Mt. Vernon, Ind.

By D. T. BLAKEY
Consulting Engineer





LEFT: Lowering one of the storage tanks into position at the Mt. Vernon plant. ABOVE: A corner of the plant building which houses mixing equipment, air compressors, B.t.u. control apparatus, etc. Building of hollow tile construction.

FOLLOWING is a brief description of the municipally owned butane-air gas plant recently installed at Mount Vernon, Ind. The unit consists of a generating and mixing plant, and distributing system of approximately 8 miles of welded steel pipe. In piping the town, consideration was given to the possibility, or in fact the strong probability, that in the near future natural gas would be available, so with this in mind, the piping of the town was so laid out and size of pipe used that would take care of a natural gas supply whenever it was available. The piping consists of 6-inch, 4-inch, 3-inch and 2-inch sizes, being installed in a system of loops, avoiding any dead ends. Valves are so located in the loops and laterals that they will enable the cutting off of sections of the town so as to inconvenience as few customers as possible

In installing this system, there were taps and welds equally distributed over the system that would supply an outlet to 1600 services, so that there will never be an occasion to drill or tap the main system after installation. The distribution system was installed by the C. I. Tenny Engineering Co. of Minneapolis, Minnesota.

The mixing equipment consists of the Thomas Recording Calorimeter in connection with the Askania and the automatic switchboard control with the Buterfly Proportioning Valves all furnished by the Cutler-Hammer Co. The air compressors consist of one 5000-cubic foot per hour machine, one 1000-cubic foot per hour machine. The 1000-foot machine automatically cuts into service when the pressure in the distribution system falls to 8 pounds, building it back up to 12 pounds, which is the pressure maintained in the distribution system. In the event, under a peak load, that the 1000-foot machine will not take care of the consumption, then the 1000-foot machine cuts in automatically at 6 pounds. In the event that this machine will not hold up the pressure, then automatically at 5 pounds pressure, the reserve supply or storage for emergency, takes up at 5 pounds. Where the pressure carried in the reserve tank or storage tank is 70 pounds and is reduced to 60 pounds, the small compressor or 1000-cubic-foot machine, gives preference to the storage tank. The B.t.u. maintained is 530 and through the Calorimeter control is held within less than 5 B.t.u. variation at all times.

Storage Tanks

The storage tanks, built by the Leader Iron Works, Des Moines, Iowa, consist of one liquid tank 8 feet in diameter by 36 feet over the shell, and the gas storage tank, 10 feet in diameter by 42 feet over the shell. All taps and lines leading out of both tanks are through the top, there being no openings in the bottom.

The building housing the generating and regulating equipment is 15 by 30 feet, of hollow tile red brick veneer, being fully fire-proof, having steel windows and doors, wired plate glass and made into two compartments with a clear wired-glass stationary window between the two compartments. The roof of the building is supported on a steel I beam perlin, supporting steel decking with one-inch Celotex and three-ply asbestos roofing, mopped down with hot asphalt.

Mixing Plant

The mixing plant is located about four city blocks from the point where the cars are unloaded, and the transfer of the liquid to the storage tanks at the plant is done through the unbalanced pressure method, using the compressed gas in the reserve storage and connections and arrangements so made that after the butane tank car is unloaded, the mixed gas pressure remaining in the car can be used in the vaporizing system until the pressure in the tank car is reduced to a pressure of a fraction over four pounds.

The cost of this plant, the 8-mile distribution system, the mixing and control equipment, building and unloading pit was $36,-309.00. The system has been in use now better than two months and is rendering excellent service, the town being thoroughly pleased with the nature of the gas and the service rendered. There is at this time something over a hundred connected services, with a potential sale of better than 300 by the early Spring.

Natural Gas Turned Into Six Kansas Towns

NATURAL gas was last month made available in the Kansas towns of Phillipsburg, Stockton, Painville, Glade, Logan, and Speed, according to an announcement by S. B. Redman, general manager of the Kansas Gas and Pipe Line Co., Salina, Kan., which is supplying the fuel. To handle the business for the district an office has been established at Phillipsburg with Bryan Dunlap as general manager for the division and Lyle Quackenbush as new business director.

Just the propane cylinder valve you have been looking for . . . combines the famous Kerotest Forged Brass Diaphragm Packless Valve design with a spring safety device which automatically relieves *only* the excess pressure that may build up in a propane cylinder. Furnished with or without operating handwheel. Listed as standard by Underwriter's Laboratories.

KEROTTST MANUFACTURING COMPANY
PITTSBURGH, PA.

Bottled Gas Men Stress Appliance Efficiency at New Jersey Meeting

By RALPH HEFFERLINE
Staff Correspondent

THE National Bottled Gas Association held its 1936 Fall Meeting October 28 at Atlantic City Auditorium, Atlantic City, N. J. Despite the fact that none of the Pacific Coast members was present and only a few of those from the Middle West, the attendance represented approximately 95 marketers, the largest representation of companies at any single meeting to date.

In the general discussion and in the prepared addresses the keynote of the meeting was increased appliance efficiencies. M. G. Farrar, of the Pyrofax Division of Carbide and Carbon Chemicals Corp., in reporting on work done in connection with the A.G.A. Testing Laboratories, stressed the value of improved appliances as competitive weapons against electricity and other fuels. In a nine months' period the laboratory has tested and approved for propane approximately 364 appliance models: 277 ranges, 57 water heaters and 30 space heaters. The minimum top burner efficiency for A.G.A. approval of propane ranges has been raised from 45 to 50 per cent, and several manufacturers are now producing burners with efficiencies of 55 per cent or higher. Comparable progress has been made in approving for propane a sufficiently wide variety of water heaters to meet all types of individual usage.

W. Z. Friend and A. B. Cameron, both of the Philgas Department of Phillips Petroleum Co., discussed sales angles for handling the improved appliances. Mr. Friend pointed out that they made the selling job easier and the service problem less, while Mr. Cameron suggested to members that those manufacturers who have revised their products in accordance with the A.G.A. Testing Laboratories recommendations deserve the wholehearted patronage of the bottled gas industry.

Meeting the competition of competitive fuels was the subject of an address by J. A. Garfield, of the Miami Bottled Gas Co., Miami, Fla. He estimated that there are more than 1,000,000 bottled gas prospects in the country. To sell them he cited the need for a cooperative national and local advertising and educational campaign, and suggested the founding of a fund for this purpose, to be contributed jointly by marketers of bottled gas and manufacturers of appliances. A further need, he contended, is a concerted effort to effect a reduction in freight rates for handling of the product.

At the business session it was announced that arrangements were being made whereby members could obtain through the association products' liability insurance. This would be at a lower rate than is now paid by those members who independently carry this insurance.

A display of bottled gas advertising, collected from all over the country, was on exhibition in the meeting hall and created considerable interest. It included not only advertising pieces used by the various marketers, but also such appliance manufacturers' advertising as portrayed the availability of bottled gas beyond city gas mains. After the meeting this material was removed to the association's offices in New York City, where it will remain open to inspection.

A spokesman for the industry, H. Emerson Thomas, president of the N.B.G.A., addressed the Commercial Session of the A.G.A. Convention on October 27, stressing the point that the general gas industry should regard bottled gas as an ally, not a foe. He stated that bottled gas serves to hold the gas load against competitive fuels until such time as city gas mains are extended, and estimated that in the past eight years no fewer than 20,000 bottled gas users have been converted to city gas use on main extensions.

The sixth Annual Meeting of the N.B.G.A. will be held in New York City, January 20, 1937, at the Waldorf-Astoria Hotel. It is expected that the chief theme of discussion at that time will relate to safety practices in the handling of liquefied petroleum gases.

Franklin R. Fetherston, secretary and treasurer, stated: "The Association is making definite progress toward increased membership. At the Atlantic City meeting the Executive Board voted to accept the applications of 26 new active members (marketers) and 1 associate member (appliance company)."

■ ■

So. Counties Co. to Occupy New Building by December

Southern Counties Gas Co., Los Angeles, Calif., is pushing construction activities on its new $12,200 office building in Wilmington, Calif., in order to insure occupancy by December 1, according to an announcement from O. R. C. Grow, district manager for the company. The new concrete, fire-proof structure is 25 feet wide by 100 feet long and will house the personnel serving the 4000-meter Wilmington area. Working in connection with Mr. Grow is Tom Allender, sales manager in charge of the merchandising activities for the district, and William Gentner, district superintendent.

Butane
Engineering
Fuel Supply
Equipment
AMERICAN LIQUID GAS CORPORATION
650 South Grand Avenue • Los Angeles, California

Chicago Co. Experiments In Customer Relations

IN its completely remodeled 63rd street store, the Peoples Gas Light and Coke Co. of Chicago is conducting with considerable success an experiment in customer relations, according to Fred J. Gebert, manager of the store. A large table surrounded by comfortable chairs has been placed near the center of the store for the convenience of customers awaiting their turn at the application desks. Each clerk has a new desk with a comfortable chair alongside for customer use, and each customer request is regarded as a confidential interview. This method of handling applications seems to be appreciated by the customers, and as a consequence business is carried on more smoothly, and sales are on the increase.

The store displays a complete line of modern appliances, and a radiant heater is kept in readiness for customer comfort. At one side of the building an all-gas kitchen has been constructed, and cooking demonstrations are conducted every Friday.

■ ■

So. Oregon Corp. Appliance Drive Shows Increase

New low rate schedules, combined with an intensive sales campaign covering all major domestic gas appliances, are multiplying appliance sales and gas output of the Southern Oregon Gas Corp. at a pace far outstripping any past records.

Sales of automatic gas water heaters have increased during 1936, an estimated 500 per cent. Gas refrigeration also is enjoying a wide acceptance in the Southern Oregon territory.

■ ■

Union Tank Car to Build 100 Butane Carriers

Because of the increasing use of butane and propane gases as household and industrial fuels, the Union Tank Car has been authorized by the Interstate Commerce Commission to build 100 more fusion-welded tank cars for the transportation of liquefied petroleum gases. Twenty-five cars which the commission authorized the company to build last April for experimental purposes are now in constant use.

■ ■

Forestry Service Fights Fire With Propane

Propane as a means of fighting forest fires is being tried by the Forestry Service of the United States Department of Agriculture. High-pressure torches, fed by small tanks of propane strapped to the backs of the Forestry Service men, serve to start backfires in the path of a spreading conflagration.

■ ■

Skelgas Constructing Bulk Station in St. Louis

A bulk station to receive tank-car lots of commercial propane is under construction at St. Louis, Mo., by Skelgas Co., distributors of bottled gas in the Middle West. The new station will supply Skelgas dealers in the vicinity, and will possibly also make wholesale sales to a number of other bottled gas companies.

SAFETY FOR VALVES

To provide protection for the valve at the top of this Hackney cylinder, a welded-on collar is used. The valve is perfectly accessible, yet completely protected against ordinary damage in spite of rough treatment in stacking, rolling, up-ending.

With over 34 years' experience in designing and manufacturing metal containers, Hackney assures correct design, fine workmanship and dependable service that mean economy.

For Butane, Propane and Butane-Propane mixtures, Hackney cylinders have been leaders of the field for many years.

Hackney MILWAUKEE

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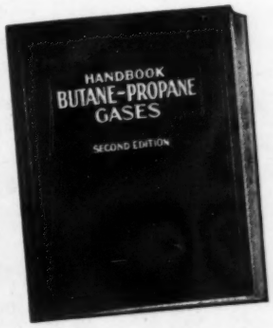

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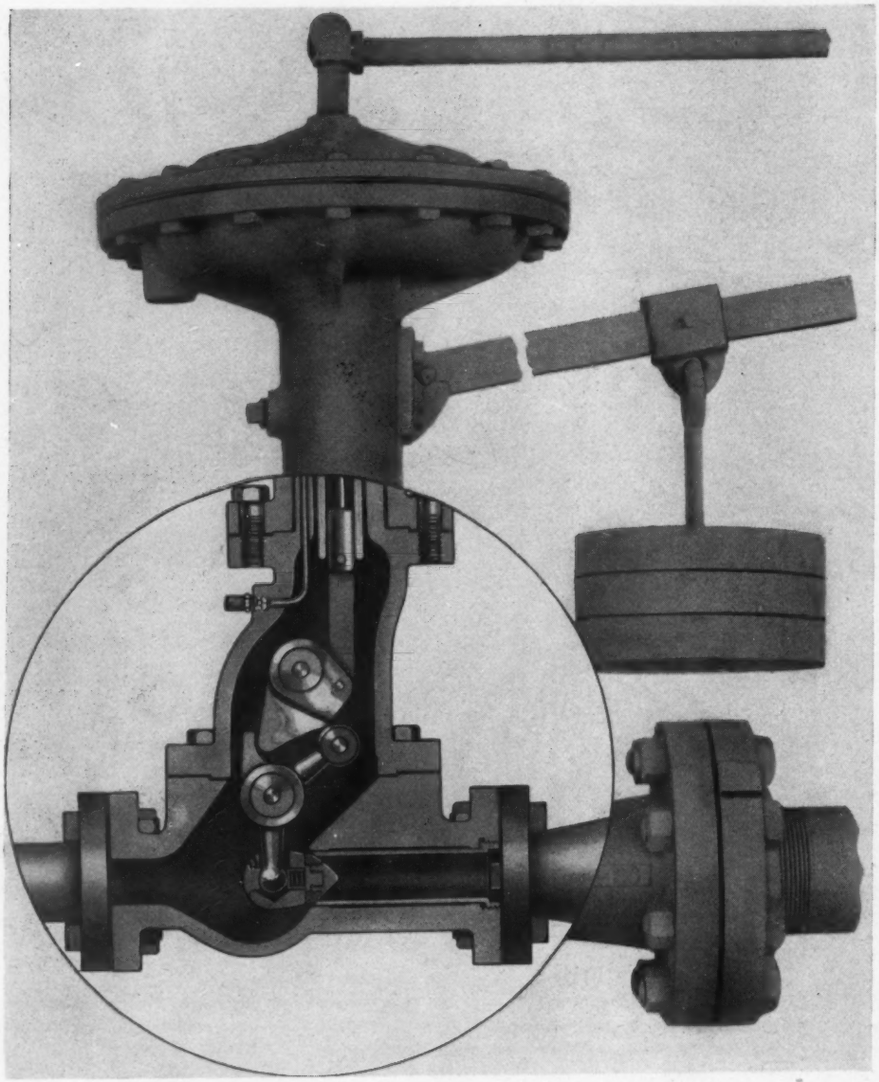

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Also manufacturers of Pilot Regulators, Relief Valves, Low Pressure Appliance Regulators, Liquid Petroleum Gas Regulators, High and Low Pressure Balanced Valve Regulators, Back Pressure Valves and Dust Filters.

RELIANCE REGULATOR CORPORATION
1000 Meridian Avenue Alhambra, California

RELIANCE REGULATORS

MEASUREMENT and CONTROL

FLUE GAS ANALYSIS

For Checking Efficiency of Combustion

By L. P. STOKER
Precision Control Company*

THE growth of our modern civilization has been dependent upon our ability to develop large quantities of power, and to utilize that energy in the production of goods to satisfy our wants. At the present time, about 600 billion horsepower is generated annually in the United States alone. Of this amount, approximately 65 per cent is generated from coal, 22 per cent from oil, 7 per cent from gas and 6 per cent by water power. From this we see that over 90 per cent of our power comes from the burning of fuels, and while we have within the borders of the United States about half the world's known supply of natural fuels, we know the supply is limited. Making due allowance for the discovery of new fields to more than offset the natural increase in fuel consumption, the life of our fuel supply is reduced to a startingly small number of generations. It therefore behooves those of us who are in any way responsible for the use of fuel for the generation of heat and power, to see that it is utilized in the most efficient manner possible.

L. P. STOKER

But there is an even more immediate need for the economical use of fuel. Power, in universal use in industry, represents one of the four major items of manufacturing cost. In some cases the power cost amounts to as much as 50 to 60 per cent of the total in which cases profits may depend upon the efficiency with which fuel is burned.

All fuels are composed primarily of two combustible elements, carbon and hydrogen. While carbon is found in the free state, although in many different forms, in coal, hydrogen is seldom found free to any extent in natural fuels. It is almost always combined with carbon in some form of hydrocarbon molecule. Combustion is simply the chemical combination of these elements with oxygen in reactions which rapidly give off great quantities of heat.

In order for combustion to take place, it is necessary to bring the combustible elements and oxygen together at a minimum temperature known as the ignition or kindling temperature. The ignition temperature varies greatly for different fuels, being about 625° F for coke, which is practically pure carbon, and over 1300° F for methane, which is the fuel having the highest percentage of hydrogen. Of course, after ignition takes place the heat generated by the combustion reaction maintains the temperature above the ignition point. If for any reason the temperature of the combining elements does drop below the ignition temperature before the reaction is complete, the reaction will be stopped and combustion will be complete. This is an important consideration in the design of furnaces. The combustion chamber must be of such size and shape that the necessary quantity of fuel will have time to completely react with the oxygen before the gases are cooled below the ignition temperature.

There are four fundamental laws which govern combustion:

1. Conservation of matter. Material going into a process must leave it.
2. Conservation of energy. Energy cannot be created or destroyed.
3. The gas law: the volume of a gas is directly proportional to its absolute temperature and inversely proportional to its absolute pressure.
4. Law of combining weights: all substances combine chemically, according to a definite simple relationship as to relative weights.

Carbon completely burns to carbon dioxide according to the following simple equation:

$$C + O_2 = CO_2 \qquad (1)$$

This reaction liberates 14550 B.t.u. for each pound of carbon burned. With a defficiency of oxygen the carbon may only partially burn to carbon monoxide according to the equation:

$$2C + O_2 = 2\ CO \qquad (2)$$

This reaction liberates only 4350 B.t.u. per pound of carbon. The carbon monoxide will further burn, however, with the liberation of an additional 10,200 B.t.u. (per lb. of carbon) according to the equation:

$$2CO + O_2 = 2\ CO_2 \qquad (3)$$

Thus, we see, the net amount of heat generated in the formation of carbon dioxide is the same whether it takes place directly or in two stages.

An analysis of the products of combustion gives us all the information we need to judge the proper operation of a boiler; that is, it tells us if the amount of air being supplied is sufficient for complete combustion or if it is greater than required and it tells us if any fuel is escaping unburned. Since the analysis is usually made with an Orsat gas analysis apparatus, which deals in volumes rather than weights, let us consider the above equations from the standpoint of volumes.

From equation (1) we see that one volume of oxygen will be consumed to form one volume of carbon dioxide. If carbon is burned with an excess of oxygen, the sum of CO_2 and O_2 in the flue products must equal the volume of oxygen put into the process. Since the oxygen for combustion is obtained from air which is composed, for all practical purposes, of 21 per cent oxygen and 79 per cent nitrogen, if 100 cu. ft. of air is burned with sufficient carbon to consume all the oxygen, 21 cu. ft. of carbon dioxide will be formed.

If carbon is burned to CO_2 in a quantity of air greater than is required for complete combustion, the sum of CO_2 and O_2 in the flue products will be 21 per cent of the total products. This fact affords a means of checking the Orsat analysis. The potassium hydroxide used for absorbing the CO_2 has a great absorption capacity, being good for 800 to 1000 ordinary analyses. It does not deteriorate readily and can therefore be relied upon to give correct results. The pyrogallic acid or chromous chloride used for absorbing the oxygen can be readily weakened by careless handling or by leakage of the apparatus. Therefore, if the sum of CO_2 and O_2 does not equal 21 per cent of the total products, it is well to check the oxygen absorbent to be sure it is active.

The fact that oxygen is present in the flue gases is not a guarantee that combustion has been complete. Considering equation (2), we see that one volume of oxygen combines to form two volumes of carbon monoxide. Then the 21 cu. ft. of oxygen contained in 100 cu. ft. of air will form 42 cu. ft. of CO or a total of 121 cu. ft. of flue products. However the same condition holds true that it is possible to have only certain definite percentages of O_2, CO_2 and CO in the products, and if any two are known, the third is determined. In this case where all three are present the Orsat analysis may be checked by the following equation:

$$(CO_2 + \tfrac{1}{2}\ CO + O_2) : N_2 = 21 : 79 \qquad (4)$$

Only one half the CO is used since the volume of O_2 was doubled in its formation. This equation simply states that the oxygen used to completely burn carbon to CO_2 shows up in the products as an equal volume of CO_2; that which is used to burn carbon to CO shows up as double the volume of CO and the balance which does not enter into the reaction passes over to the flue products unchanged. Therefore the sum of these volumes, taking into account the increase in the

* Presented before the Southern California Meter Association, September 24, 1936.

formation of CO, must still bear the same ratio to the nitrogen as did the oxygen in the original air.

The foregoing is a special case in which the only combustible constituent was pure carbon. Most fuels contain hydrogen in varying amounts. The equation for the hydrogen reaction is:

$$2\ H_2 + O_2 = 2\ H_2O \qquad (5)$$

The heat liberated in this reaction is 61,400 B.t.u. per pound of hydrogen burned. However this heat is not all available in the average industrial or boiler furnace since the gases are exhausted at a temperature above the boiling point of the water vapor formed. Thus not only is the sensible heat of these vapors lost, but also the latent heat of vaporization. The actual usable heat amounts to only 51,400 B.t.u. per pound of hydrogen burned. However, when the flue gas sample is drawn into the Orsat, the water-jacketed burette condenses this vapor so that it practically disappears from the analysis, leaving only the nitrogen which belonged to the oxygen consumed in burning the hydrogen.

When a fuel containing carbon and hydrogen as the only combustible constituents is burned to carbon dioxide and water, three times as much oxygen is required to burn a pound of hydrogen as is required to burn a pound of carbon. From equation (1), 32 pounds of oxygen are required to burn 12 pounds of carbon, while from equation (5), 32 pounds of oxygen will burn only 4 pounds of hydrogen. The ratio of H to C for the same quantity of oxygen is thus 4 to 12 or 1 to 3. If, therefore, the ratio of hydrogen to carbon in a fuel is known, it is possible to determine what part of the oxygen used will change to CO_2 and what part will form water and thus disappear from the analysis. Let:

h = per cent of H_2 in fuel (by weight)
c = per cent of C in fuel (by weight)

Then the ratio of O_2 changed to CO_2 to that changed to water will be in the ratio of c to 3h. If the 21 cu. ft. of O_2 contained in 100 cu. ft. of air is completely burned with such a fuel, the volume of CO_2 formed will be:

$$\text{cu. ft. } CO_2 = 21 \times \frac{c}{c+3h} = \frac{21}{1+3h/c} \qquad (6)$$

The total products of combustion will be this volume plus the 79 cu. ft. of nitrogen. Since the Orsat measures the volumes on a percentage basis this equation can be changed to read:

$$\%CO_2 = \frac{\dfrac{21}{1+3h/c}}{\dfrac{21}{1+3h/c}+79} \times 100 = \frac{8.86}{0.422+h/c} \qquad (7)$$

This percentage CO_2 is the maximum obtainable for a fuel of the given composition and is determined solely by the hydrogen-carbon ratio of the fuel. This percentage also represents the condition for maximum combustion efficiency since less air causes incomplete combustion and more air a dilution of the flue gases with an increase in the loss of sensible heat and both attended by a lowering of the per cent CO_2 in the flue products.

Thus we see the application of the first fundamental law, the conservation of matter, that everything that goes into a furnace shows up again in the flue products (or ash in the case of solid fuels) and that there can be only certain definite quantities of CO_2, O_2 and CO (provided there is no unburned hydrogen). The Ostwald chart shown in Fig. 1, is calculated for Kettleman Hills gas and affords a most convenient means of checking the Orsat analysis graphically. Any point within the triangle represents simultaneous values of the volumes of the three flue gas constituents, CO_2, O_2 and CO. If two are known the third is determined by the intersection of lines representing their values and no other quantity is possible.

The most difficult part of the operation of the Orsat is the accurate determination of CO, particularly when present in small amounts. A procedure followed by test engineers of the Pacific Gas & Electric Co. is to use two oxygen absorbing pipettes, one to take out the major portion of the oxygen and the second to complete the absorption. In this way the second pipette will stay fresh for a long time and insures accurate determination of the oxygen. Thus with accurate determination of the O_2 and CO_2, any unburned constituents will show up from the Ostwald chart.

There is another point to be noted here. While the chart will show the presence of unburned, it will not necessarily be CO. Until relatively recently it was believed that the hydrogen, because of its greater affinity for oxygen, burned first and the carbon had to be satisfied with whatever oxygen was left. It was William A. Bone who began his research studies of combustion and flame propagation at Owens College, Manchester, England, some forty years ago and has continued them since at the Imperial College of Science & Technology, London, who discovered that hydrogen could be present in considerable quantities in the presence of oxygen and with or without CO. The following analyses of gases from three different boilers illustrate the point:

PER CENT BY VOLUME

	Bo. No. 1	Bo. No. 2	Bo. No. 3
CO_2	5.3	8.0	10.5
O_2	0.0	5.4	2.5
CO	9.6	0.8	0.0
H_2	4.8	1.0	0.0
CH_4	3.5	0.8	0.6
C_nH_{2n}	0.3	1.0	0.0
N_2	76.5	83.0	86.4

Thus we see that a simple analysis of the flue gases, properly taken and checked, will tell us a great deal about the combustion of a fuel. If the temperature of the gases leaving the boiler is taken in conjunction with a gas analysis, a very close approximation of the actual combustion efficiency can be made. The analysis gives us the composition of the gases from which their specific heat can be calculated. It also gives us the quantity as a ratio of the quantity of fuel being burned. With the temperature known, the heat content of these gases can be calculated. This

100 Pounds or More Cut to Medium or Low Pressure

CF

GAS pressures of 50 to 100 pounds or more in tanks or transmission lines are reduced to medium or low pressure in the distribution system by the Fulton Toggled Reducing Regulator. It can be equipped to operate with either natural or manufactured gas, maintaining the desired delivery pressure. Constructed with oversize valves, for industrial furnace installations. Also adapted for control of By-Product Coke Oven Gas. Catalog on request.

Fulton Toggled Reducing Regulator

THE CHAPLIN-FULTON MFG. CO.

28-40 Penn Avenue **Pittsburgh, Pa.**

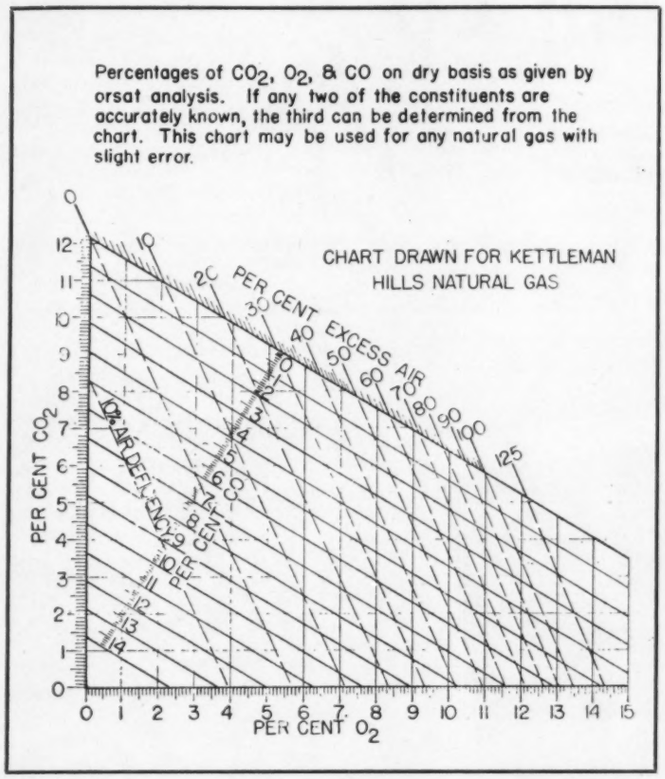
Percentages of CO_2, O_2, & CO on dry basis as given by orsat analysis. If any two of the constituents are accurately known, the third can be determined from the chart. This chart may be used for any natural gas with slight error.
CHART DRAWN FOR KETTLEMAN HILLS NATURAL GAS
PER CENT EXCESS AIR
PER CENT CO
PER CENT AIR DEFICIENCY
PER CENT CO_2
PER CENT O_2

FIG. 1. Ostwald chart for checking Orsat analysis.

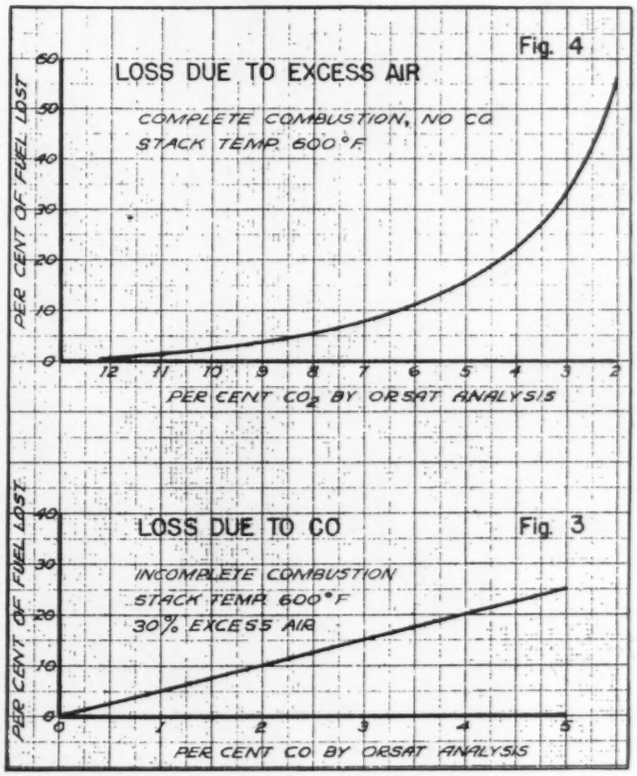

FIG. 4. Fuel loss due to excess air and to the presence of CO in flue gas.

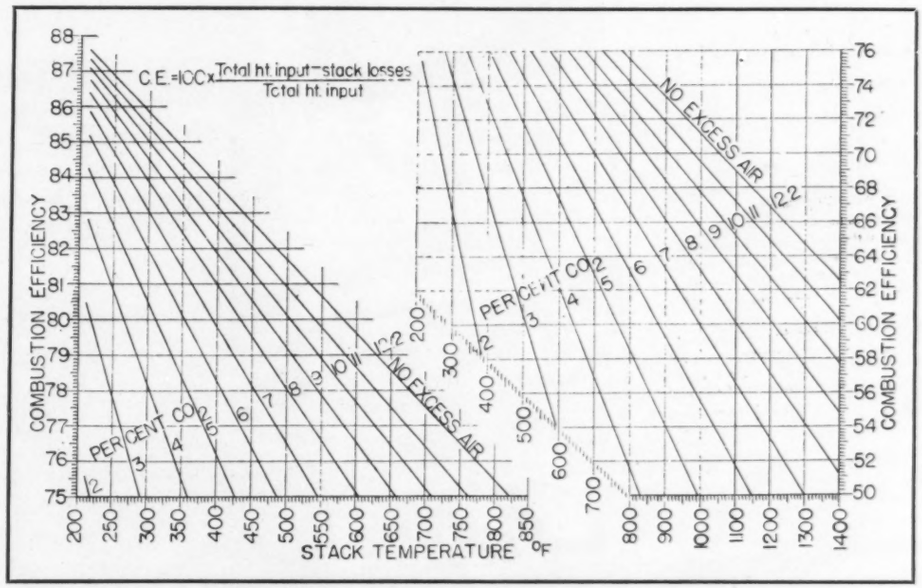

FIG. 2. Combustion efficiency chart for 1200 B.t.u. natural gas, based on combustion being complete.

value represents the heat loss up the stack. The only other heat loss, aside from boiler blowdown, is radiation from the boiler and setting which amounts to from 2 to 5 per cent. Fig 2, also calculated for Kettleman Hills gas, gives the efficiency directly from the CO_2 and the flue gas temperature. This figure is for complete combustion and is really furnace efficiency as no allowance has been made for radiation.

The charts, Fig. 3 and Fig. 4, show respectively the per cent fuel lost due to unburned fuel and to excess air for Kettleman Hills gas. It can be seen from these curves that proper proportioning of fuel and air pays good dividends. On boilers of 150 HP and up, automatic control is a good investment. In fact, with a fluctuating load, it is decidedly costly to operate without good automatic control.

As to the manner of taking the flue gas sample, it should be drawn from about the center of the gas stream with the sample tube at right angles to the flow and as short a connection to the Orsat as possible. For the purpose of adjusting dampers or burners, the sample should be taken from a point shortly after combustion has been completed. The reason for this is that leakage of air into the gas passages beyond the combustion chamber makes it more difficult to tell when the maximum CO_2 has been attained. Boilers of the Heine type are particularly hard

COMMITTEE

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Load Building News

P. C. Gas G. A.

THE MODERN FUEL

COMMITTEE

Douglas Buckler
Southern California Gas Company

Clifford Johnstone
Managing Director
Pacific Coast Gas Association

Eighth consecutive year of regional cooperative advertising, Pacific Coast Gas Association

MAY and DECEMBER
Companions in Comfort—with Modern Gas Heating on Guard
Indoors, all months are May to all ages—when a thermostat, instead of chance or the weather, governs temperature.
With automatic gas heating, a flick of your finger whisks you to the sunny side of the calendar—summons instant, uniform warmth. Complete winter air conditioning may be added—assuring constant circulation of filtered air, with exact humidity control.
If you now have gas heating that was installed years ago or is inadequate for present needs, it will pay you to modernize. Have more heat at less fuel cost; enjoy even greater convenience.
If you are still using a fuel characterized by smoke or soot, noise or odor, delivery, storage, handling, work or dirt—change to clean, carefree, dependable, economical GAS this winter. Attractive prices, extended terms, reduced carrying charges, lowered gas rates—all urge, "Do it now."—Pacific Coast Gas Association, Inc. (a non-profit service organization of which your Gas Company is a member), 447 Sutter Street, San Francisco.
Finger-Tip Control
Select temperature desired and let the THERMOSTAT be your furnace man. Automatic or semi-automatic (push button) regulation is now available at small cost for all gas heaters and furnaces, including no-basement types. Inquire of Appliance Dealers or Your Gas Company.
ILLUSTRATED (upper right) is a recessed, concealed radiator, seen in many newer homes. Adapted to gas-fired steam or hot-water central heating plants, as well as individual gas-steam units.
Gas
THE MODERN FUEL

Reproduction in reduced size of the full-page November Domestic Consumer advertisement

"HUMAN INTEREST" HIGHLIGHTS NOVEMBER DOMESTIC CONSUMER ADVERTISEMENT

Smiling faces of youth and age reflect the comfort of gas heating in the November advertisement for domestic consumer magazines. Portraying a warmly human incident pleasantly familiar in many homes, the photographic illustration of this advertisement actively projects its "human interest" into the explanatory text.

Through "Sunset", parent-teacher, club women's and home building magazines, these appealing gas sales messages reach an average of over 250,000 Pacific Coast homes each month.

Results Indicate Active Buying Interest

In the October issue of Sunset Magazine, a P.C.G.A. news release described a new type of gas appliance. So responsive were readers that the manufacturer immediately began receiving widespread inquiries from Sunset subscribers. Recent gas heating advertisements in this same magazine, published by the Cooperative Advertising Committee, carried a coupon. Many "prospects" have been referred to member companies as a result of inquiries thus received by the Association.

to keep tight, because of the great length of contact between headers and drums and the brick setting. For the purpose of checking efficiency the gas sample should be taken after the last heating surface, and the temperature of the gases taken at the same point.

Chromous chloride is an excellent absorbent for oxygen as it acts very quickly and one filling will remove all the oxygen from over thirty full samples (50 or 100 cc, depending on the instrument) of free air in two passes. The method of preparation is given in a bulletin entitled, "Methods of the Chemists of the United States Steel Corp. for the Sampling and Analysis of Gases," published by the Carnegie Steel Co., Pittsburgh, Pa. Because of its great affinity for oxygen, the prepared solution should be handled in an atmosphere from which the oxygen has been excluded. A stream of natural gas from a rubber hose directed on the liquid while transfering it is excellent. The solution can usually be transferred to the Orsat by syphoning easier than by pouring and with less exposure.

■ ■

Slide Rule Paper Presented At S.C.M.A. Meeting

THE October meeting of the Southern California Meter Association at the Van Matre Inn in Huntington Park, Calif., featured the presentation of a paper on the Helmick slide rule by W. E. Helmick, of the Shell Oil Co. The rule was developed by Mr. Helmick for obtaining combined correction factors used in the measurement of natural gas, including superexpansibility factors. Guy Corfield, Los Angeles Gas and Electric Corp., president of the Association, led the discussion.

Unique on the program was the appearance of C. E. (Deke) Houlgate, nationally known football authority, who sketched for the members a brief outline of the national football situation. Mr. Houlgate was introduced by B. G. Williams, measurement engineer for the Southern California Gas Co. To conclude the program a 16-millimeter all-talking motion picture took the members on a trip through Death Valley, Calif. The picture was shown through the courtesy of the Union Oil Co. of Calif. Over 50 members of the association attended the meeting.

■ ■

A.G.A. Laboratories Issues Gas vs. Electricity Book

THE American Gas Association Testing Laboratories at Cleveland has published and distributed an attractive 36-page illustrated pamphlet, "Reprints of Articles Covering Use of Gas and Electricity for Domestic Cooking and Heating Purposes." Five semi-technical papers by two of the Laboratories' executives on different phases of the ever-present gas versus electricity issue are reproduced in it. These articles were originally printed in the journals of the industry.

Only the first two chapters deal with the economics of using the two forms of energy. The entire book is based upon research and study at the Testing Laboratories and at various other institutions. The new booklet presents the salient facts found in Bulletin No. 6, "Investigation of Domestic Cooking by Gas and by Electricity," which was published last year, and contains much additional useful information. This pamphlet was compiled to aid gas and gas appliance salesmen, and to serve as promotional material as well. Every member company of the A.G.A. has received two copies without charge, and additional copies may be secured from the American Gas Association Testing Laboratories, 1032 East 62nd Street, Cleveland, Ohio.

■ ■

Chairman Organizes P.C.G.A. Technical Section

OTTO GOLDKAMP, of the San Diego Consolidated Gas & Electric Co., chairman of the Technical Section of the Pacific Coast Gas Association, last month announced the chairmen to head the committees of the Section. A. B. Allyne, Southern Counties Gas Co., will serve as vice-chairman of the Section.

The principal committee chairmen are as follows: Distribution committee, Frank Pape, Pacific Gas and Electric Co.; Production committee, John Keillor, B. C. Electric Co.; Transmission committee, A. B. Allyne, Southern Counties Gas Co.; Utilization committee, Guy Corfield, Los Angeles Gas & Electric Co.

Appointed as chairmen of sub-committees under the Transmission committee by Mr. Allyne were B. G. Williams, Southern California Gas Co., large volume measurement; H. J. Smith, Pacific Gas and Electric Co., compressor plants; H. G. Laub, Southern California Gas Co., pipe protection; and F. E. Wilson, Pacific Gas and Electric Co., pipe lines.

Mr. Corfield named as sub-committee chairmen under the Utilization Committee C. A. Thorp, Los Anglees Gas & Electric Corp., gas lighting, and R. I. Snyder, Los Angeles Gas & Electric Corp., gas appliance testing.

■ ■

Coast Counties Co. Starts Home Service Department

MRS. Winifred Davison has been appointed to the staff of the Coast Counties Gas and Electric Co. as home service representative, according to a report from H. W. Edmond, general sales manager of the company.

This is the initial step in utility home service work to be carried on in the territory served by the company, which includes Santa Cruz, Monterey, San Benito, Santa Clara and Contra Costa counties. Mrs. Davison has had a wide experience in both the use of electrcial and gas cooking equipment, and has recently completed demonstrations in which she assisted Mrs. Katheryne Welch of the James Graham Manufacturing Co.

■ ■

Kansas Towns Grant Natural Gas Franchise to Tri-county

The Tri-county Gas Co., Holcomb, Kansas, has been granted a 20-year franchise to serve natural gas to Lakin, Deerfield, Holcomb, Scott City, Friend, and Tennis, all of Kansas, according to an announcement from T. P. Curran, vice-president of the company. The area comprises approximately 1,000 meters. Coal and oil are the fuels supplanted by the development. Work has already begun on pipe lines to bring the gas from the Finney-Kearney County fields in western Kansas.

FRANK DECATUR WHITE

Detroit-Michigan Co. Retains F. D. White, Cooking Expert

The Detroit-Michigan Stove Co. has retained the exclusive services of the nationally known cooking school expert and food lecturer, Frank Decatur White.

A graduate of one of the large eastern schools, Mr. White, after working with his father in a flour mill, started to turn his father's product into attractive and appetizing cakes as a pastime. His hobby became so well known and his cakes so much sought after that he decided to take up demonstrating and lecturing as a livelihood. Today he is probably the best known male food lecturer in the United States.

Mr. White's demonstrations are scientific in nature, as may be illustrated by the fact that he can make anyone of 119 cakes from memory and most of them while blindfolded.

The Detroit-Michigan Stove Co. is now offering the services of Mr. White to utility companies and dealers.

■ ■

Michigan Gas Reserves Set at 42,200,000,000 Cubic Feet

A recent estimate by the Bureau of Mines revealed that gas resources in central Michigan fields approximate 42,200,000,000 cubic feet. Geologists of the Bureau said that the proved and semi-proved gas reserves were sufficient to warrant plans for supplying local markets, but warned against large investments for transporting gas for considerable distances until further investigation might prove gas present in a quantity to warrent such investments.

■ ■

Spokane Gas and Fuel Joins Mystery Chef

The Spokane Gas and Fuel Co., Spokane, last October 28 joined the seven other companies on the Pacific Coast in the Mystery Chef radio program as rebroadcast from NBC studios in New York by transcontinental telephone. The Spokane company will use the facilities of its local NBC station KHQ.

A. G. A. Atlantic City Convention Heralds Revival of Industry

(Continued from Page 16)

noons far eclipsed last year's record, according to F. L. Griffith of the Peoples Gas Light and Coke Co., chairman of the section. Of especial interest to this section were the five parallel luncheons on Wednesday afternoon which met to discuss the subjects of office management, customer accounting, credits and collections, customer relations, and general accounting.

Under the direction of C. E. Bennett, chairman, the Commercial Section papers emphasized the need of more dealer outlets to keep up with the expansion of the industry. Much attention was devoted to the problems of appliance financing, the development of promotional rates, and the importance of local tie-in with the current national advertising campaign. Winning awards in the national range, refrigerator, and water heater sales contests were awarded on Wednesday afternoon.

At the Home Service meeting on Tuesday afternoon the program was devoted to ways and means of increasing sales through improvements in appliances to save housewives wasted effort and time, the best manner of preparing good home service newspaper copy, and to a symposium of two-minute talks on pertinent subjects.

Sales constituted the background for all discussions of the Industrial Gas Section under the chairmanship of C. W. Gale, Knoxville Gas Co., Knoxville, Tenn. Coming up for particular discussion was the subject of air-conditioning and engineering improvement in industrial gas apparatus. Industrial sessions were held on Tuesday, Wednesday, and Thursday afternoons. Well attended and greatly enjoyed by the industrial men was the Industrial Gas Club luncheon on Wednesday.

Chairman F. A. Lydecker, Public Service Electric & Gas Co., Newark, N. J., called Technical Sections sessions to order on Tuesday and Thursday afternoons. Contributing to the industry's general fund of technical knowledge were papers on such subjects as the economics of energy distribution, the use of radio cars for normal and emergency dispatching in public utility operation, the "Syracuse Power Mixer," "Water Conditioning as Applied to Gas Plants," "The Purification of Commercial Gases at Elevated Temperatures," "The Economics of Oil Refining by the Gas Industry."

Entertainment

The convention program was crowded with entertainment. On Monday night there was a general get-to-gether, featured by community singing and entertainment by the NBC Troubadours. Greatly enjoyed by the visiting delegates was the President's Reception on Tuesday night. A highlight for the ladies was the bridge-tea given Wednesday afternoon at the Hotel Claymore. An audience of approximately 2000 attended the concert on Wednesday evening in the ball room of the Atlantic City Auditorium. The program featured Margaret Speaks, radio star and concert artist; Ross Graham, featured artist on the Maxwell House Show Boat; The Modern Choir, and Rosario Bourdon and his orchestra.

A. G. A. E. M. Exhibit

Most revitalizing both to the association and to the industry at large was the reappearance after a lapse of two years of the appliance and equipment exhibit, staged this year for the first time under the auspices of the A. G. A. E. M. Held in the huge Atlantic City Auditorium, the exhibit covered many hundreds of feet of floor space and featured equipment designed to introduce gas to new domestic and industrial uses. Particular attention was attracted to equipment for air-conditioning, the production of power, and for refrigeration on a commercial scale.

Evident to the many visitors at a glance was the trend toward modernization and beautification in the design of household gas appliances.

Every afternoon at 5:30 P. M. during the exhibit the A. G. A. E. M. gave to an employee of a gas company a new 1937 Buick sedan. The innovation proved highly successful both as entertainment and in bringing a crowd to the exhibit.

Officers of the A. G. A. E. M. re-elected to serve for the 1936-37 term are:

President: William T. Rasch, president, American Gas Products Corp., New York, N. Y.

Vice-President: Merrill N. Davis, vice-president, S. D. Dresser Manufacturing Co., Bradford, Pa.

Treasurer: Donald McDonald, secretary, American Meter Co., New York, N. Y.

C. W. Berghorn will continue as executive secretary.

At the regular meeting of the A. G. A. E. M. during the convention President Rasch urged a program for the coming year of full membership in every section of the country, a coordinated program for national sales plans and promotion, coordination of research projects, and a continuous appraisal of legislation to avoid regulation harmful to the industry and its customers.

Awards

Highest honor for outstanding service to the gas industry during the past year was rendered three men at the Awards ceremony, October 29. The men honored were Leon J. Willien, George Edward Hitz, and George L. Greeley.

Leon J. Willien, operating engineer, Public Utility Engineering and Service Corp., Chicago, Ill., received the Charles A. Munroe Award in recognition of his "rational and consistent research, success and number of applications, generosity of contributions, originality and usefulness to the industry, in the

The Goodman Stopper

The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California

U. S. SUPER de LAVAUD CAST IRON PIPE

"Cast without chill in a metal mold"

U. S. PIPE AND FOUNDRY COMPANY
Burlington, N. J.

GAS RANGE DEALERS *Attention*

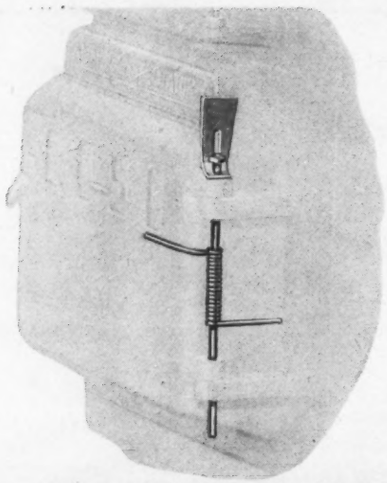
IN COOPERATION with the Gas Appliance Society of Northern California, the P. G. and E. has revised its November advertising schedule to include two newspaper advertisements on Gas Ranges. The Company will also devote floor and window space to Gas Range displays and will take such other steps as may be found practical between now and November 1 when the campaign begins. Details are not yet perfected, but from all we have seen and heard the Society will spend more money and do a bigger and better promotional job than it has ever attempted before. Moreover, we all know that the modern Gas Range is highly salable merchandise. Completely re-styled and greatly improved mechanically, it appeals to every woman whose present range is more than a few years old. In other words, we have something to talk about. The campaign is sound. We suggest that you read the official bulletins the minute they arrive. Decide what you're going to do about it. Then follow through! ●

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

Owned · Operated · Managed by Californians

WFR 211-1136



★

This . . .

FURNACE DOOR CLOSER

Insures Burner Efficiency

This practical device holds the fire door tightly shut. It works automatically whenever door is blown open, but is provided with a wedge to hold door open when need be. Strongly built and cadmium-plated. Write for details on this and other Inland products — we offer many new devices to stimulate sales and cut service costs.

★

DISTRIBUTORS

Los Angeles, Calif., Harry V. Payne — Atlanta, Ga., Clow Gasteam Heating Co. — Boston, Mass., Herbert H. Skinner — Dubuque, Iowa, A. Y. McDonald Mfg. Co. — Lakewood, Ohio, Harry L. Powers—Detroit, Mich., Peter Cheli, 3636 Devonshire.

INLAND GAS SPECIALTIES

INLAND MANUFACTURING COMPANY
(Dept. 2) 1120 North Cicero Ave., Chicago, Illinois

GOOD FROM THE BLUE PRINT UP

Long ago my father and his father before him practiced the policy of starting at the drafting board to build good furnaces and boilers. And I have made it a point to follow the pattern which they so wisely cut.

H. P. MUELLER,
President.

L. J. Mueller Furnace Co.
Milwaukee

MUELLER-MILWAUKEE

REDUCE
Operating Cost
— WITH —
SPRAGUE METERS
— AND —
SPRAGUE REGULATORS

SPRAGUE METER COMPANY
Bridgeport, Conn.
Los Angeles-San Francisco, Cal.

field of advanced processes for manufacturing, mixing and transmitting gas."

Presentation of the award, a substantial financial acknowledgement and engrossed certificate, was made by Marcy L. Sperry, president of the Washington Gas Light Co., Washington, D. C., and chairman of the Charles A. Munroe Award Committee, which was composed of Charles W. Bradley, vice-president, Public Service Co. of Northern Ill., Chicago, Ill., and Harry D. Hancock, engineer, Cities Service Co., New York, N. Y.

Mr. Willien has been honored by the American Gas Association on many previous occasions. In 1928 he received the Beal Medal. He was chairman of the Technical Section in 1924, chairman of the Committee on Disposal of Waste from Gas Plants in 1920, and chairman of the Carbonization committee in 1922. For many years he was a member of the Managing committee of the Technical Section. In 1932, Mr. Willien was elected an honorary member of the Pacific Coast Gas Association.

George Edward Hitz, superintendent of distribution, gas department, Central Hudson Gas and Electric Corp., Poughkeepsie, N. Y., received the Beal Medal for contributing the best technical paper to Association meetings throughout the year. The presentation was made by F. A. Lydecker, chairman of the Association's Technical Section, acting in behalf of the family of the late W. R. Beal who established the award in 1897. The paper which won recognition was entitled "Experience in Leak Proofing Bell and Spigot Joints."

G. A. Harrison, assistant general manager, Toledo Edison Co., Toledo, Ohio, was chairman of the Beal Medal Committee, other members being F. A. Lydecker, general superintendent, gas distribution, Public Service Gas and Electric Co., Newark, N. J., and M. I. Mix, superintendent of distribution, The Peoples Gas Light and Coke Co., Chicago, Ill.

The award consists of a bronze medal and a substantial cash payment. It has been bestowed sparingly. Following are those who have received the medal: Henry L. Doherty, Arthur Glasgow, I. N. Knapp, B. H. Spangenberg, Henry L. Rice, W. H. Gartley, C. J. Ramsburg, H. W. Alrich, L. E. Worthing, C. O. Bond, O. B. Evans, F. E. Steere, E. J. Brady, F. W. Sperr, Jr., A. W. Warner, R. L. Brown, L. J. Willien, Louis Stein, P. T. Dashiell, R. B. Harper, S. S. Tomkins, and W. H. Fulweiler.

For heroic action in averting a serious fire George L. Creely, gas distribution superintendent, Public Service Electric and Gas Co., Somerville, N. J., was awarded the American Gas Association Meritorious Service Medal for the most meritorious deed in the saving of life in the gas industry. The presentation of a gold medal, button and certificate, was made by the Associations' president, L. B. Denning, president of the Lone Star Gas Co., Dallas, Texas.

The act for which Mr. Creely was honored occurred during a severe electric storm at 2:00 P.M. on May 13, 1936. A bolt of lightning had struck a 216,000-gallon gasoline storage tank adjacent to the property of the gas company distribution department. The bolt opened a seam along the edge of the tank top for a distance of 6 feet, allowing

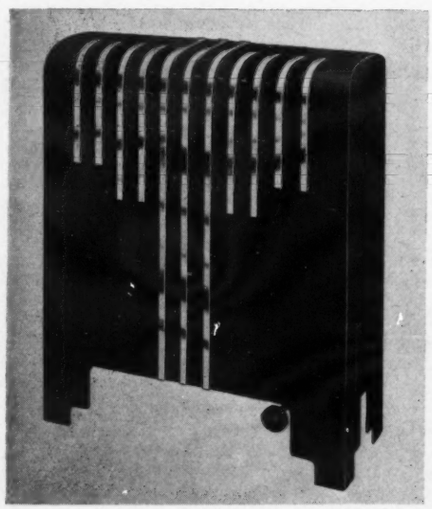
gasoline fumes to escape. The fumes soon ignited and burned to a height of from 2 to 3 feet.

Mr. Creely, who was in his office nearby, was advised that the tank was on fire, and upon investigation saw an arc of flame creeping along the top edge of the tank. Realizing the hazard, and with complete disregard for his personal safety, he immediately ran to the tank and climbed the 40-foot iron ladder to the top. Footing was treacherous as the top of the tank is slightly conical; it was wet, and there is no guard rail around the tank. Upon reaching the top of the tank he took off his rain coat, using it to subdue the flames. Within five minutes he had extinguished the flames.

■ ■

General Gas Light Offers New Circulating Heater

THE General Gas Light Co., Kalamazoo, Mich., manufacturers of the Humphrey Radiantfire and other quality gas appliances, announce the Humphrey No. 30-C



Circulator, a smartly designed and durably constructed gas-burning heater intended for installation in living rooms, offices, small stores, and shops. Constructed along modern lines, the heater features fan equipment for forced circulation, which is supplied at the option of the customer.

■ ■

Consolidated Gas Builds New Line in Oklahoma Area

To supplement the natural gas supply to Commanche, Duncan, Marlow, Lawton, Fort Sill, Fletcher, Elgin, and Apache, Oklahoma, the Consolidated Gas Utilities Corp. has inaugurated the laying of a $100,000 pipe line from the Cement gas field, according to Paul S. Pierson, division manager for the company at Lawton. Natural gas from three wells in the field will be carried by 8 miles of 10-inch pipe to connect with the company main near Rush Springs.

■ ■

Gas for Pumping Stations

Pacific Gas and Electric Co. is preparing to install and connect natural gas service to serve four pumping stations on the new Shell Oil Co. Bakersfield to Martinez line.

JOHNSON NO. 1
Soldering Furnace

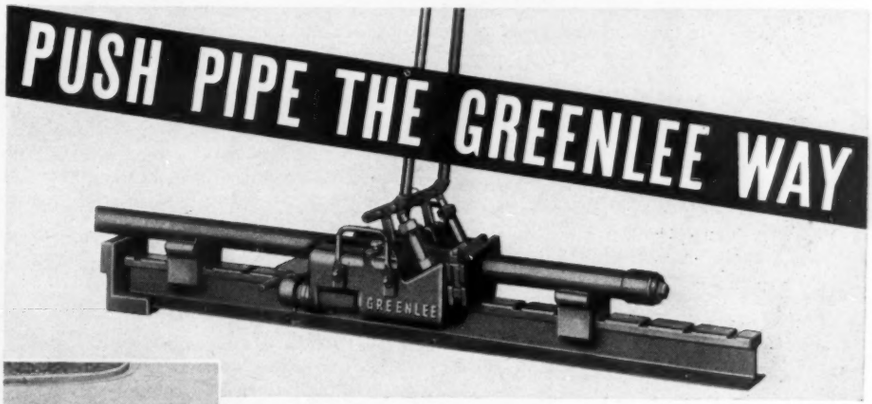
Here is a compact, powerful, efficient Bench Furnace for heating soldering Coppers up to 6 lbs. per pair, heat-treating, tempering and annealing of carbon steel tools and parts. No forced air blast required. Heavy refractory lining in fire-box assures uniform heat. Patented curved shaped hood forces return blast over tops of irons or parts being heated.

Write for full details

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Western Representative:
C. B. BABCOCK CO.
135 Bluxome Street
San Francisco, Calif.

Eastern Representative:
J. H. McPHERSON
250 Stuart Street
Boston, Mass.



Above is the Greenlee Hydraulic Pusher set up for pushing pipe under a paved street. One man, standing in a comfortable position, can exert a pressure of 40,000 pounds on the pipe clamp.

Saves Time and Money

If you are using a pipe pusher that requires several men to operate it, you can save considerable time and money by putting a Greenlee Hydraulic Pusher in service. And if you are making underground installations by trenching, you can save still more. No longer is it necessary to tear up lawns and pavement or to do extensive trenching, back-filling, etc.

With the Greenlee, it is only necessary to make a trench long enough to accommodate the pusher with a section of pipe, and one man can send it where it is wanted, simply by pumping the handles. Eight speeds are provided for varying soil conditions, and a push of from 4 to 7 feet can be made, depending on the length of base used, without changing the pipe clamp.

Investigate this improved method of pushing pipe for gas or any other purpose. Complete information will be sent, gladly.

GREENLEE TOOL CO., 1700 Columbia Ave., ROCKFORD, ILL.

GREENLEE TOOL CO., 1700 Columbia Ave., Rockford, Ill.
Please send complete details on the Greenlee Hydraulic Pipe Pusher.

Company .....

Address .....

City..... State.....

By..... G11-36

Air view of American Meter Co.'s Metric Metal Works plant at Erie, Pa. This unit of the company occupies more than 170,500 square feet and employs over three hundred people. In the right foreground is the new brass and alloy foundry.

A.G.A. Laboratories Assistant Joins New Jersey Zinc

HARRY W. SMITH, Jr., assistant in the publication department, American Gas Association Testing Laboratories at Cleveland, resigned October 1 to take a position in the market development division of the New Jersey Zinc Co., New York City.

Mr. Smith came to the Laboratories in November, 1931, from the Bell Telephone laboratories, New York City. After completing an assignment in the industrial gas research work on the elimination of noise in industrial gas burners, he was transferred to the publications department.

Snowden Fluckey, a graduate of Princeton University in 1933 with a B.S. in Engineering (Chemical) degree, is Mr. Smith's successor in the publications department of the Testing Laboratories. Mr. Fluckey had been employed in the testing and research departments of the Laboratories.

■ ■

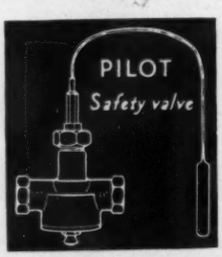
Okla. Co. Constructs Line

The LeFlore County Gas Co., Poteau, Okla., has begun construction on 25 miles of 8-inch pipe line to carry gas to terminals at Red Oak, Okla., and a point approximately 10 miles northeast of Poteau.

BUILD YOUR HOUSEHEATING LOAD WITH KLIXON CONTROLS

These two advanced Klixon devices give exact automatic temperature control and assure positive pilot protection for your gas-fired space heaters . . . provide sales features that make it easy to sell gas heating.

Write today for descriptive bulletins.



SPENCER THERMOSTAT COMPANY
Unit of Metals & Controls Corporation
34 FOREST STREET • ATTLEBORO, MASSACHUSETTS

AIR CONDITIONING
Electrogas
HEATING EQUIPMENT

FURNACES BLOWERS FILTERS WASHERS

Write for attractive Dealer proposition

ELECTROGAS FURNACE & MANUFACTURING CO.
2575 Bayshore Boulevard, San Francisco

MODERN METHODS AND MATERIALS

A letter to GAS will bring you any of the selected reference bulletins listed below, without cost. Indicate by number which you desire.

NO. 150—INDUSTRIAL METERS
Three positive displacement meters for industrial uses with hourly capacities of 5,000, 10,000 and 32,000 cu. ft. are described in this bulletin. Contains complete list of parts, and drawings show construction of various assembly units

NO. 151—IRON AND STEEL
Illustrated bulletin shows the application of nickel-chromium cast irons and steels in gas industry equipment where unusually severe conditions of corrosion, friction or heat must be met. For each of the several applications a comparative table is given showing the relative performance of these and other materials.

NO. 152—PIPE COATING MATERIALS
Very comprehensive, attractively compiled and bound, 80-page bulletin covering pipe coating and pipe coating materials. Deals with the subject in considerable detail under such headings as cleaning pipe before application, priming, enameling in the field showing methods and equipment, coupling compounds, inspection, wrapping, whitewashing, etc. For each operation a quantity table for ordering the materials is given.

NO. 153—REGULATORS
Loose-leaf folder on a line of spring loaded and dead weight pressure regulators for outlet pressures of from 3 to 8 inches water column or up to 16 inches by the addition of heavier springs. Contains cut-away drawings showing construction, performance charts and a complete parts price list.

NO. 154—AIR CONDITIONING UNIT
Leaflet describes a new line of automatic air conditioning gas furnaces designed for year-round air conditioning. Contains table of specifications.

NO. 155—GAS BURNERS
A 44-page loose-leaf bulletin covers a line of gas conversion burners, burner units, pressure regulators, gas shut-off valves, control equipment, etc. Contains specification tables and pertinent engineering data.

NO. 156—SPACE HEATER THERMOSTATS
Illustrated folder describes six different types of space heater thermostats for various installations. Contains table showing comparative costs in a test case of heating with gas and with coal.

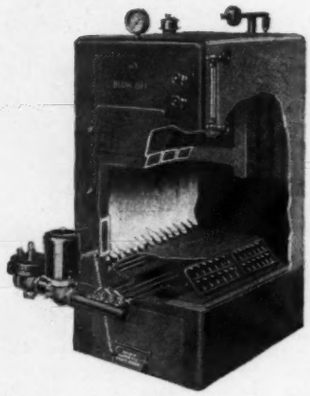
NO. 157—LOW PRESSURE REGULATORS
Illustrated folder describes construction and operation of a line of low pressure regulators for controlling burner pressure on gas ranges, small space heaters, water heaters and similar appliances. Gives specifications and prices and performance curves.

NO. 158—CONTROL SYSTEM
Bulletin describes a new system of complete process control through a coordinated control system utilizing a line of control instruments.

NO. 159—HEATING ACCESSORIES
Illustrated folder complete with tables of specifications covers a line of indirect water heaters, tankless water heaters, water heater-boiler booster, fire pot generator, cleaning valves, mixing valves, etc.

BARBER BURNERS

Another Reason for Supremacy



—a COMPLETE Range of Sizes and Shapes!

BARBER Conversion Burners are made in such a ***wide variety*** of sizes and types (from "small-house" to fully "Automatic Control" models) that it is easy to select the PROPER one to FIT any home heating plant. Round or rectangular furnaces or boilers, of ANY grate dimensions, are thus enabled to deliver their ***maximum efficiency***. It naturally costs BARBER more to offer this extra variety, but it costs YOU no more—and it is absolutely ***imperative*** to the final satisfaction of your customers. Remember that when you tie up with ANY Conversion Burner.

- Made in 8 different sizes to accommodate round grate diameters from 12″ to 34″. Also "tailor-made" to SUIT and FIT the grate dimensions of rectangular furnaces or boilers.
- They insure a "scrubbing" flame action against side walls of firebox, at the proper level, with 1900° Fahrenheit flame temperature.
- No fire brick or refractory elements needed to deflect the flame to the side walls. Barber Burners require only 70% of the installation time of average burners using such elements.
- Equipped with the improved Barber noiseless jets, unequaled for air-mixing efficiency.
- Furnished with Baltimore Automatic Safety Pilot Control—positive and accurate.
- Listed in the A. G. A. Directory of Approved Conversion Burners.

We supply Sales Literature, Specification Data Sheets and Practical Sales Assistance. Write at once for our NEW Illustrated Catalog No. 37 and Revised Price List

THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, Ohio

Address Michigan Inquiries to
THE BARBER GAS BURNER COMPANY OF MICHIGAN
4475 Cass Ave., Detroit, Mich.

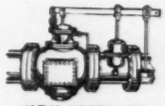
BARBER *Automatic* JET GAS BURNERS

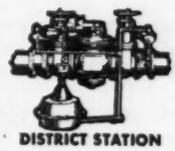
for Warm Air Furnaces, Steam and Hot Water Boilers

and Numerous Other Heating Appliances

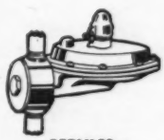
☆ Reynolds

FOR EVERY GAS CONTROL REQUIREMENT


HIGH PRESSURE


DISTRICT STATION

INDUSTRIAL


SERVICE

LOW PRESSURE

"If it is a gas control problem—see REYNOLDS!" Since the beginning of the industry's history, control problems have increased . . . become more and more complex.

Reynolds gas regulators, with over 40 years of experience in developing, designing, building and testing behind them, have developed with the industry.

Today . . . these *proved* Reynolds Gas Regulators are recognized by the industry's engineers as the thoroughly reliable, dependable control factors that have *more* than kept pace with the times.

Write our Engineering Department at the factory—or our nearest branch office or representative—for immediate and full cooperation.

☆

REYNOLDS PRODUCTS

High Pressure Service House Regulators—Straight Lever Type—Models 0-10-20 series; Toggle Lever Type—Model 30 series.

Low Pressure Service or Appliance Regulators.

District Station Regulators, Single or Double Valve—Auxiliary Bowl and Automatic Loading Device Optional.

High Pressure Line Regulators—Pilot Loaded—Pilot Controlled.

Toggle Type Regulators—Single Vavle, Double Valve, Triple Outlet.

Seals—Dead Weight or Mercury . Back Pressure Valves . Automatic Quick Closing Anti-Vacuum Valves . Automatic Shut Off Valves . Lever Operated Valves . Louver Operated Device . Atmospheric Regulators . Vacuum Regulators.

Branch Offices:
421 Dwight Building
Kansas City, Mo.
2nd Unit,
Santa Fe Bldg.
Dallas, Texas

Representatives:
Eastern Appliance Co.
Boston, Mass.
F. E. Newberry,
Avon, N. J.

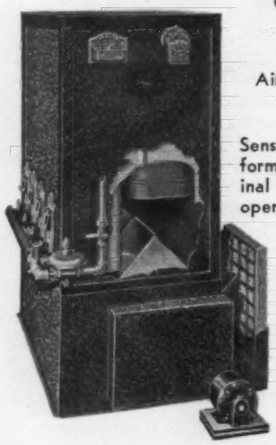
REYNOLDS GAS REGULATOR CO.

ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

NEW LOW COST

FRASER



Gas Furnace and Winter Air Conditioning System

Sensational in performance, low original cost and low operating cost.

Write for details today.

Manufactured by

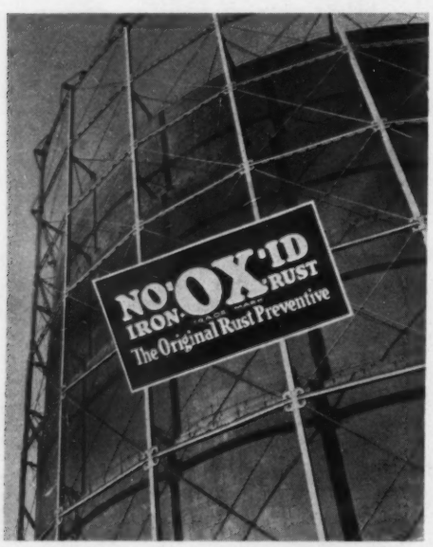
Fraser Furnace Company

Stockton, Calif.

Distributed by

H. R. Basford Company

San Francisco **Los Angeles**



Stop Loss of Metal

The steel in gas holders and pipe lines is best preserved by the use of NO-OX-ID. For pipe line protection NO-OX-ID is so adaptable that it meets all conditions of application. NO-OX-ID combinations lend themselves to hand field application and to machine field or yard application. Many gas companies have stopped the loss of metal with NO-OX-ID.

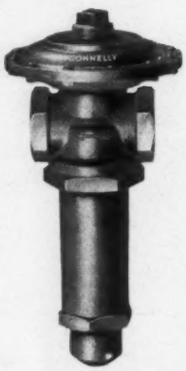
DEARBORN CHEMICAL COMPANY

Los Angeles: 807 Mateo Street Phone TRinity 3385

San Francisco: 421 Bryant Street Phone SUtter 8688

One of the reasons for going to Atlantic City, October 25-30 is to see the exhibition and learn why gas companies are using

Connelly Iron Sponge Offers New Relief Valve



Announcement is made by the Connelly Iron Sponge & Governor Co., Chicago, Ill., of a new screwed diaphragm accurate relief valve, type H. P. R. F. for line pressures up to 125 pounds. The valve can be furnished to open accurately at pressures from one to 100 pounds, and when closed is leak proof. The valve is made in all sizes from ¼-inch to 4-inch, seats selected to suit conditions.

■ ■

Merco Nordstrom Entry Wins Advertising Award

In competition with hundreds of advertising exhibits entered by leading industrial concerns, an entry from the Merco Nordstrom Valve Co. of Pittsburgh and Oakland won first award at the Fourteenth Annual Convention of the National Industrial Advertising Association which recently convened in Philadelphia. The exhibit consisted of a series of quadra-color inserts that have appeared in numerous trade journals featuring Nordstrom Valves. The campaign was prepared under the direction of Rodney S. Reed, Jr., advertising manager of the valve company, and was placed by The McCarty Co., advertising counsellors.

■ ■

Natural Gas Being Brought To Rochester, N. Y. Area

Permission to construct a 92-mile natural gas transmission line from the natural gas fields of Pennsylvania and New York to the city of Rochester, N. Y., has been granted to the Cabot Gas Corp., a company organized for that purpose. Fourteen-inch pipe will be used, and the cost of the line with laterals is estimated at $1,750,000.

Natural gas will be offered to Rochester industrial firms, the principal one being the Kodak Park plant of the Eastman Kodak Co.

■ ■

Oregon Corp. Extends Mains

Three and one-half miles of new service main extension is being laid in the Hillcrest addition in Medford, by the Southern Oregon Gas Corp. Work is being rushed to take care of the new major gas heating installations, and should be completed by the end of October.

■ ■

Franchise Granted P. G. & E.

Pacific Gas and Electric Co. last month was granted a 35-year franchise by Pacific Grove, Calif., according to press dispatches. Company engineers have completed arrangements for the installation of a new 6-inch main along Central Avenue to replace the 4-inch main formerly in use.

Lee B. Mettler, Industrial Burner Manufacturer, Dies

LEE B. METTLER, owner of the Lee B. Mettler Co., Los Angeles, Calif., manufacturers of industrial gas burners died November 13 at the Glendale Hospital, Glendale, Calif., after an illness of three months. Mr. Mettler was widely known in the industry throughout the country for the past 35 years. For 20 years he pioneered the market for automatic gas water heating as a salesmanager and production manager for eastern utilities

Coming to the Pacific Coast some 15 years ago, he invented the Mettler Entrained Combustion Burner, the first low pressure industrial burner to be put on the market. At the time of his death, Mr. Mettler was actively engaged in the manufacturing of this product.

Mr. Mettler was a member of the American Gas Association, the Pacific Coast Gas Association, and for many years has been a prominent figure at all gas industry conventions.

■ ■

T. G. Arrowsmith, Well-known Gas Man, Dies

Thomas G. Arrowsmith, widely known figure in the gas industry on the Pacific Coast, died in October at the age of 63.

Engaged in the gas industry during most of his business life, Mr. Arrowsmith was well known both on the West Coast and in the East. He was with the Seattle Gas Co. for many years of his early business career, later representing various Eastern manufacturers in San Francisco. Several years ago he was called from the coast to be manager of the Hoffman Heater Co. at Lorraine, Ohio, which position he held for several years. At the time of his death Mr. Arrowsmith was engaged in the gas appliance business in Oakland.

■ ■

Kansas Gas Fields to Supply Large Industries

Concerted action by large industries in Hutchinson, Kan., recently boosted the load taken daily from Kansas gas fields by 500,000 cubic feet, according to gas company officials. Contracts to use the Kansas gas binding for a 5-year period were signed by the Morton Salt Co., the Barton Salt Co., the Carey Salt Co., and the Central Fibre Products Co. Gas had formerly been supplied the companies by the Wichison Gas Co., Wichita, Kan., which piped the gas in from Oklahoma and Texas fields. The Morton and Barton Salt companies will be served by the Gas Service Co., Kansas City, Mo. The Carey Salt Co. is now connected to the lines of the Salt City Gas Co.

■ ■

Authorize Sweet Gas Use

The first order authorizing use of sweet gas in a carbon black plant since the enactment of the gas waste laws was issued recently by the Texas Railroad commission. The order specifically applies to the Polo Oil Co.'s Sanford No. 1 well in Hutchinson county.

PERFORMANCE *measures the value of* BLAW-KNOX GAS CLEANERS

Reduction of Customer Complaints due to dust picked up by gas

"Availability" of Compressors during Peak Loads

Freedom from Dust Deposits on Compressor Valves

Lower Pump Station Upkeep Costs

Fourteen repeat orders from a large transmission system, totaling twenty-six units—indicate a definite confidence in the ability of Blaw-Knox Gas Cleaners to eliminate dust troubles, to reduce maintenance costs, and to maintain public relations.

This large transmission system (name on request) has invested in Blaw-Knox Gas Cleaners as follows:

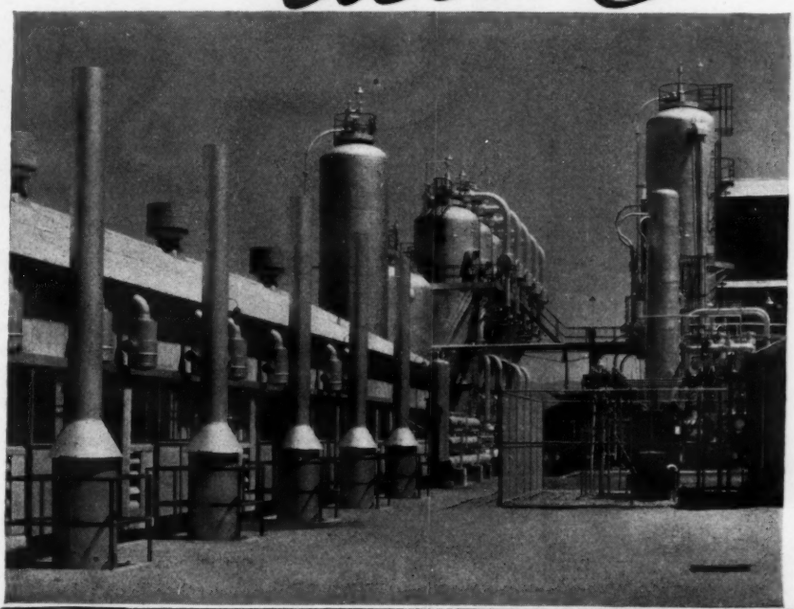
Number of orders—14
Total number of units—26
First purchase—August 22nd, 1930
Last purchase—August 19th, 1935
Maximum working pressure—450# Ga.
Combined capacity—31,595,000 cf. hr. at 150# Ga. or
59,823,000 cf. hr. at 350# Ga.

This record of purchases indicates satisfaction with results from the equipment and an appreciation of the importance of the *protection* and *transportation cost reduction* afforded by Blaw-Knox Gas Cleaners.

Blaw-Knox Gas Cleaners are fully engineered, reliable and efficient, backed by a manufacturer who accepts the responsibility for meeting your conditions and fulfilling all performance claims. Full information about Blaw-Knox Gas Cleaners, large or small, is yours for the asking.

BLAW-KNOX COMPANY
2033 FARMERS BANK BUILDING - PITTSBURGH, PA.
Offices in Principal Cities

THIS IS AN *Action* PHOTO OF **FLUOR**



AIR-COOLED MUFFLERS

Economy and safety characterize every installation of Fluor Air-Cooled Mufflers. They eliminate the use of water, of costly drainage systems, of expansion couplings, of maintenance and operating attention. Because air alone is employed as the cooling agent, exhaust pipe scale cannot form, back pressures are uniformly low, engine room, foundation and stack temperatures are cooler, engine operation is quieter and corrosive steam vapors are entirely absent.

Remember that the flexibility of Fluor Air Cooled Muffler design permits installation on bottom and overhead engine exhausts; that provision can be made for cooling and/or heating buildings in which they operate. Write for descriptive Bulletin No. M-436.

The Fluor Corporation, Ltd.
909 East 59th St., Los Angeles, Calif.
909 McCormick Bldg., Chicago, Illinois; 30 Church St., New York City, N. Y.; 1406 Esperson Bldg., Houston, Texas; 703 Fairfax Bldg., Kansas City, Mo.; 719 McBirney Bldg., Tulsa, Oklahoma

BE SURE WITH FLUOR — **FLUOR AIR-COOLED MUFFLERS**

THE above photograph of the subcommittee for Approval Requirements for gas space heaters was taken recently at the Testing Laboratories in Cleveland.

Left to right the group includes C. E. Golden, Standard Oil Co. of Calif.; W. Z. Friend, Philgas Division, Phillips Petroleum Corp.; R. M. Conner of the A.G.A. Testing Laboratories; G. E. Lester (representing C. F. Turner), East Ohio Gas Co.; H. R. Humphrey, General Gas Light Co.; C. E. Froelich, Continental Stove Corp.; J. H. Eiseman (Chairman), National Bureau of Standards; F. O. Suffron, F. R. Wright and R. C. Gregg of the A.G.A. Testing Laboratories; J. F. Anthes, Brooklyn Union Gas Co.; G. C. Carnahan, James B. Clow and Sons Co.; C. P. Bovard, Equitable Gas Co.

Members of the committee not shown in the photograph are: H. L. Masser, Los Angeles Gas and Electric Corp.; G. C. Blackmore, Automatic Gas Steam Radiator Co.; G. F. Reznor, Reznor Manufacturing Co.; F. A. Wegener, The Welsbach Co.; and W. P. Yant, U. S. Bureau of Mines.

The Laboratories' staff members in the photograph are not members of the committee but were invited to the meeting.

■ ■

Porcelain Enamel Building To Be Converted to Office Use

THE Porcelain Enamel building, one of the major attractions at the Great Lakes Exposition in Cleveland this summer, is to become the office building of the Ferro Enamel Corp. in Cleveland.

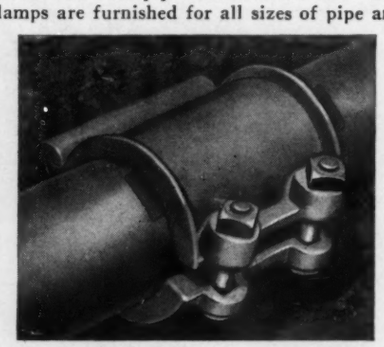
The building will be dismantled and reerected in front of the enameling company's plant. This will mean the piece by piece removal and identification of approximately 1200 porcelain enamel panels from the building's exterior. To convert the building into a modern office structure will necessitate insulation, replacement of several porcelain enamel panels with windows and the installation of a heating plant and interior partitions.

The Porcelain Enamel building includes about 6,000 square feet of porcelain enameled panels on its exterior walls, which represent the first use of haskelite panels for the complete outside surfacing of a building. The building is 100 feet long and 30 feet wide with an exterior color combination of yellow, blue, red-violet and light orange-red.

■ ■

M. B. Skinner Co. Offers Redesigned Pipe Clamp

M. B. SKINNER CO., South Bend, Ind., is now offering a line of redesigned pipe clamps, especially constructed for installation while the pipe line is in service. The clamps are furnished for all sizes of pipe and



may be installed on lines carrying all but the highest pressures.

New specifications for the Skinner clamps call for a metal composition of higher tensile strength and uniform density and hardness. To insure perfection in its product, the company has installed equipment to test each clamp under a pressure of 3000 pounds before it leaves the factory.

■ ■

Coast Counties Builds Office

Coast Counties Gas & Electric Co., Santa Cruz, Calif., is constructing a new office building in Los Banos, Calif., according to a report from company officials. The new building, which is expected to be ready for occupancy by the first of the year, will be constructed of reinforced concrete, earthquake-proof, and air conditioned. Including the heating plant and fixtures, the cost is placed at $9,000.

HYDRAUGER

MODERN HORIZONTAL BORING MACHINE

For Underground Installation of Pipe and Conduits. Avoids damage to costly pavements and saves time. Send for Bulletin.

HYDRAUGER CORPORATION, Ltd.
116 New Montgomery St.
San Francisco, Calif.

BASO

THERMO ELECTRIC SAFETY CONTROL FOR GAS BURNING APPLIANCES

BOILERS ★ FURNACES ★ CONV. BURNERS ★ SPACE HEATERS ★ UNIT HEATERS ★ AIR CONDITIONERS OVENS ★ RANGES ★ WATER HEATERS, ETC.

MILWAUKEE GAS SPECIALTY CO.
MILWAUKEE ★ WISCONSIN

GAS VALVE SERIES 500

ELECTRIC SWITCH SERIES 600

Western Gas
is compressed by
COOPER-BESSEMERS
50 to 1600 horsepower

THE COOPER-BESSEMER CORPORATION
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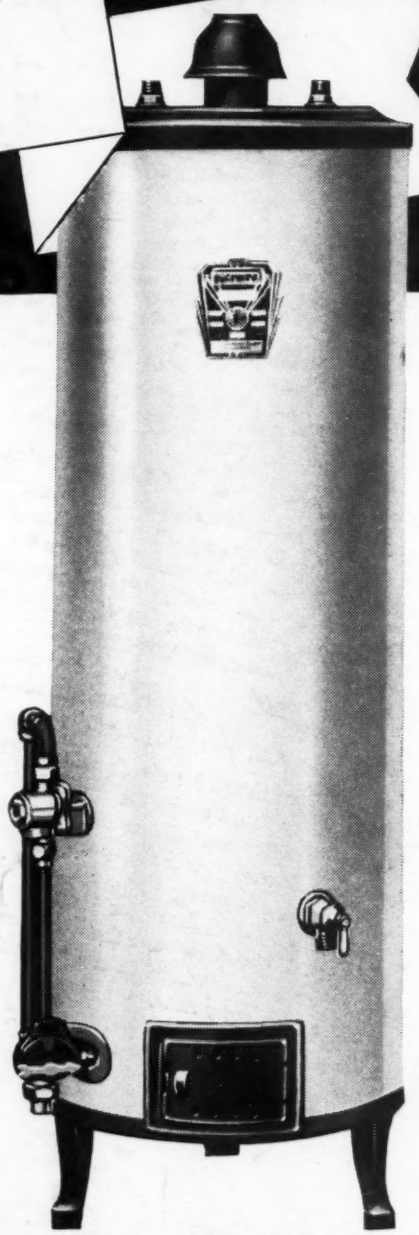

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